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SECOND REVISED FEASIBILITY STUDY
FOR
THE ARAB REGIONAL CENTRE FOR THE TRANSFER AND DEVELOPMENT OF TECHNOLOGY

78-2243

TABLE OF CONTENTS

Page

1.0 Preface 1

2.0 ECWA's Programme and Plan of Action 5

3.0 Background Information 15

3.1 Technology Transactions in the Arab World 17
3.2 Some Implications of Prevailing Technology Transactions 21

4.0 Institutional Infrastructure in the Arab World 25

4.1 Planning and Policies 26
4.2 Research and Development (R&D) 27
4.3 Patents, Licences and Intellectual Property 28
4.4 Project Development, Consultancy and Design Activities 29
4.5 Training and Education 31
4.6 Information Services 33
4.7 Standards and Quality Control 33

5.0 Assessment of the Need for an Arab Regional Centre for the Transfer and Development of Technology 35

5.1 Justification and Logistics 38
5.2 Design Factors and Limitations 41

6.0 The Arab Regional Centre for the Transfer and Development of Technology 45

6.1 Objectives of the Centre 46
6.2 Functions and Activities of the Centre 47
6.3 Level of Activity and Scheduling 58
6.4 Governance 64
6.5 Organization and Structure 67
6.6 Budget and Finance 77
6.7 Location of the Centre 81
6.8 Manpower, Staffing and Consultants 84
6.9 Detailed Budget 87

TABLE OF CONTENTS (CONT'D)

Page

7.0 Specimen Projects 89

7.1 Sample of Possible Topics for Study 89

8.0 Action Programme for the Establishment of the Centre 91

8.1 Phase One 91

8.2 Phase Two 92

8.3 Phase Three 93

9.0 The Euro-Arab Dialogue and the Arab Regional Centre .. 95

ANNEXES

I. Findings of Interagency Missions to the Arab States 103

II. List of Institutions and Names of Officials Visited by Missions in the Arab Countries 113

III. Affiliations of Members of the Two Missions 129

IV. Resolution of the Joint Meeting of Representatives of Arab Governments and Arab Regional Organizations on the Arab Regional Centre for the Transfer and Development of Technology 131

V. REPORT: Arab Meeting to Discuss Possibilities for Euro-Arab Co-operation in Establishing a Centre for the Transfer of Technology, Cairo, 20-21 September 1978 133

VI. ECWA Resolution 61(V): The Arab Regional Centre for the Transfer and Development of Technology................137

THE ARAB REGIONAL CENTRE FOR THE TRANSFER AND DEVELOPMENT OF TECHNOLOGY

1.0 Preface

Purposive activities towards the acquisition of science and technology are common occurrences in history. Since the early days of the nineteenth century one witnesses such efforts, often on a large scale, in Egypt and the Ottoman Empire; other efforts in this direction can also be noted elsewhere in the Arab world. In the post World War II period, the needs of developing countries for science and technology have received increasing attention. The United Nations system has committed itself to promoting the acquisition of science and technology on a steadily expanding scale. Technology transfer has been one of the concepts that has received substantial attention.

More specifically, one may trace the beginning of a United Nations substantive commitment in this direction to the United Nations Conference held in 1963 on the application of science and technology for the benefit of the developing countries and to the United Nations General Assembly adoption in 1970 of the International Development Strategy for the Second United Nations Development Decade. This resolution called for the transfer of technology to less developed countries (LDCs) and the providing of assistance to LDCs to develop indigenous technology. A major step towards the realization of the concept was adopted at the third session of the United Nations Conference on Trade and Development (UNCTAD) in Santiago in April/May 1972. Resolution 39(III) of this Conference was a starting point of a series of initiatives by institutions within the UN system. UNCTAD Resolution 87(IV) and a number of field missions by UNCTAD staff went some way toward developing and exploring the original notions. The Regional Plan of Action for the Application of Science and Technology to Development in the Middle East[1] called for institutional developments for the transfer of science and technology.

The area of the transfer of technology was also given special attention by the Arab League Educational, Cultural and Scientific Organization (ALECSO) and was included in its 1975-1977 Work Programme. The Conference of Ministers of Arab States Responsible for the Application of Science and Technology to Development

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[1] ST/UNESOB/11 by the United Nations Economic and Social Office in Beirut, 1974, UN, New York.

(CASTARAB), convened in Rabat from 16 to 25 August 1976, adopted the Rabat declaration dealing with various aspects of technology development and planning, as well as other recommendations on science and technology policies in the Arab States, technology transfer and assessment, national scientific and technological potentials and scientific and technological information.[1] At the level of the Arab League, the General Committee of the Euro-Arab Dialogue decided in Tunis on 12 February 1977 to form an *ad hoc* group on the transfer of technology. After an exchange of views between the Arab and European side, a draft joint declaration on the transfer of technology was worked out. The various aspects of technology transfer were also considered at the Conference on "Industrial Property and Transfer of Technology to the Arab States" held in Baghdad[2] between 5 and 10 March 1977. The Economic Commission for Western Asia has participated in this effort. In 1977 it published the report entitled "*Mechanisms for the Transfer and Development of Technology in the ECWA Region*" (E/ECWA/50, 22 March 1977). Lately, transfer of technology was again a subject matter in the discussions and resolutions of the Conference of Ministers of Industry of Arab States, convened in Tunis in November 1977.

Progress has been made elsewhere toward pursuing the concept to its logical conclusion. The Economic and Social Commission for Asia and the Pacific (ESCAP) established the centre for the transfer of technology in June 1977. The Economic Commission for Africa (ECA) held in Arusha, Tanzania on 8 May 1978, the first session of the Council for the African Regional Centre for the Transfer, Adaptation and Development of Technology. At that time, 24 African States signed the agreement for the establishment of the Centre. In Latin America, SELA (Sistema Economico Latin Americana) initiated in March 1977 preparatory work to transform *existing* development centres into centres for the development and transfer of technology.

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[1] Final Report, Conference of Ministers of Arab States Responsible for the Application of Science & Technology to Development, Rabat, 16-25 August 1976.

[2] The Conference was sponsored by the Industrial Development Centre for Arab States (IDCAS), the United Nations Industrial Development Organization (UNIDO), The World Intellectual Property Organization (WIPO), and the Iraqi Ministry of Industry and Minerals.

This study is a revised version of the feasibility study presented at the Joint Meeting of Representatives of Arab Governments and Arab Regional Organizations, Amman, 16-18 September 1978 and at the fifth session of ECWA, Amman, 2-6 October 1978. It benefited from the discussion and comments made at these two meetings. It also includes relevant information from the working paper.[1]

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[1] A Working Paper entitled "The Arab Centre for the Transfer and Development of Technology was prepared for submission to the First Preparatory Interagency Meeting; 36 pages, 6 October 1977, E/ECWA/NR/3, prepared by Prof. A.B. Zahlan, Consultant. Henceforth referred to as the Working Paper.

2.0 ECWA's Programme and Plan of Action

2.1 On 28 April 1977 the Economic Commission for Western Asia adopted Resolution 51(IV) to study the possibility of establishing a Centre for the Transfer and Development of Technology for all the Arab States in which ECWA's secretariat was requested:

- to prepare and submit to the next session a study on the possibility of establishing a Regional Centre for the Transfer and Development of Technology;
- to expand the coverage of the Centre to cover all Arab countries, and that the Centre serve the Arab countries as a whole. ECWA's secretariat was asked to co-operate with ECA in order to cover the Arab countries in North Africa which are members of ECA;
- to co-operate with all relevant United Nations and regional organizations in implementing this study;
- to associate the governments concerned in the closest possible manner in the preparation of the required study.

ECWA gave special attention to the implementation of this study and, for a number of reasons, decided to make use of the services of a highly experienced consultant to assist in the execution of the project.

2.2 A Plan of Action for implementing this study was worked out, which was later revised after consultation with the Secretary General of the Arab League. The Plan of Action was as follows:

- ECWA is to call for a preparatory interagency meeting in Beirut, between 24-28 October 1977, to which all relevant United Nations and Arab regional organizations and funds will be invited. The purpose of the meeting is to discuss and agree on the "terms of reference" of the feasibility study. The Consultant is to prepare a Working Paper for the October 24-28, 1977 preparatory interagency meeting.

- A field mission(s) will then visit the 13 member countries of the ECWA region as well as the Arab countries in North Africa who are members of ECA. Arrangements were to be made with ECA for this purpose, including the exchange of field missions reports on Arab countries in North Africa.

The field mission will commence from 1 November 1977 until 12 January 1978.[1]

The field missions will consist of experts from ECWA and UNCTAD as well as any expert from any of the United Nations and other regional organizations and funds who are invited to the interagency preparatory meeting and who are willing to participate in these field missions at their own expense. Depending on the degree of participation of these organizations in the field missions, ECWA will then decide whether to send one mission to cover all the countries concerned or to divide it into two missions each covering certain number of countries. The Consultant himself is not going to participate in the missions.

The field mission will meet with the Consultant in Beirut after it terminates its visits to the Arab States. During this meeting, the mission findings will be discussed and evaluated.

- ECWA will then prepare a draft feasibility study on the establishment of an Arab Regional Centre for the Transfer and Development of Technology. This study will set forth the basic guidelines for the establishment of a Technology Transfer Centre and will contain recommendations concerning governances, management, staffing, budget, location, functions and services as well as project document.

- A second interagency meeting is to be called for by ECWA between 27 February to 1 March 1978 with the same participation as in the first preparatory interagency meeting to discuss the draft feasibility study which will be revised later on the basis of discussions and recommendations of this meeting.

- An intergovernmental meeting, at senior experts level, will then be held between 27 and 29 March 1978[2], to which all the Arab Governments will be invited to discuss the first revised draft of the feasibility study. ECWA will prepare a second revised draft of the feasibility study on the basis of the deliberations of this meeting.

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[1] The completion date of the mission later on changed to around mid-December 1977 when it was decided to send two missions instead of one.

[2] As a result of the recommendation of the second interagency meeting and the immediate follow-up action described by the consultations that took place between ECWA and the Secretariat General of the League of Arab States, it was decided to hold the meeting at the level of ministers concerned with science and technology and to enlarge the participation in this meeting so as to include representatives from relevant Arab regional organizations. It was also decided to change the date of the meeting to 24-26 April 1978. But due to the situation in Beirut the meeting was again postponed to 16-18 September 1978.

- The feasibility study will then be submitted to ECWA's fifth session scheduled during the third week of April 1978 for discussion and approval.[1/] ECWA will, if necessary, revise the feasibility study on the basis of the relevant deliberations of the session.

After taking into consideration the comments of the fifth session of ECWA, a second revised draft feasibility study will be prepared and submitted to the Economic and Social Council of the League of Arab States for discussion and approval.

- Following the approval of the second revised draft feasibility study by the Economic and Social Council of the League of Arab States and in co-operation with the secretariat of the League, invitations to a meeting will be extended to Arab governments, concerned regional Arab organizations and the Economic Commission for Western Asia for the purpose of taking the necessary measures to set up the Arab Regional Centre for the Transfer and Development of Technology.

2.3 The adopted Plan of Action led so far to the following actions:

2.3.1 ECWA held a first preparatory interagency meeting in Beirut, between 24-28 October 1977, to which the Arab League, the Arab League Educational, Cultural and Scientific Organization (ALECSO), the Arab Labour Organization (ALO), the Arab Fund for Economic and Social Development (AFESD), Conference of Ministers of Arab States Responsible for the Application of Science and Technology to Development (CASTARAB), Council of Arab Economic Unity (CAEU), Industrial Development Centre for Arab States (IDCAS), The Abu Dhabi Fund for Arab Economic Development, The Islamic Bank, The Kuwait Fund for Arab Economic Development, The United Nations Conference on Trade and Development (UNCTAD), The United Nations Educational, Scientific and Cultural Organization (UNESCO), The United Nations Industrial Development Organization (UNIDO), The Food and Agriculture Organization of the United Nations (FAO), International Labour Organization (ILO). The World Intellectual Property Organization (WIPO), and The Saudi Fund for Economic Development were invited.

The following organizations accepted the invitation and attended the meeting: The Arab League Educational, Cultural and Scientific Organization (ALECSO), The Arab Labour Organization (ALO), Arab Planning Institute (API), Council of Arab

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[1/] The date of the Fifth Session was later on changed to 2-6 May 1978.

Economic Unity (CAEU), The Food and Agriculture Organization of the United Nations (FAO), Industrial Development Centre for Arab States (IDCAS), International Labour Organization (ILO); Kuwait Fund for Arab Economic Development; The United Nations Conference on Trade and Development (UNCTAD), The United Nations Educational, Scientific and Cultural Organization (UNESCO), The United Nations Industrial Development Organization (UNIDO), and The World Intellectual Property Organization (WIPO).

The Consultant prepared a Working Ppaer for the October 24-28, 1977 first preparatory interagency meeting entitled "The Arab Centre for the Transfer and Development of Technology".1/

The Working Paper contained a brief analysis of the various activities generally referred to by technology transfer (including transfer of tools, techniques and know-how) technology choice; measures and policies that influence these events, and a discussion of the various types and functions of a technology Centre. The Paper also contained a sample set of questions to guide the mission planning to visit the Arab States. The design of these questions was based on both a detailed knowledge of practices in the region and the experience of similar missions elsewhere in the world.

Discussion and amendments of the recommendations and views presented in the Working Ppaer are contained in the Report on the Preparatory Interagency Meeting on the Arab Centre for the Transfer and Development of Technology.2/ The Working Ppaer was revised accordingly integrating new ideas and relevant comments made during the meeting.3/

2.3.2 Two field missions then visited the member countries of the ECWA region as well as the Arab countries in North Africa who are members of ECA. Arrangements were made with ECA to provide ECWA with the mission reports on the five Arab countries covered by the ECA study while ECWA will provide ECA with reports on the other Arab countries in North Africa covered by the field missions.

1/ 36 pages; E/ECWA/NR/3

2/ 23 pages; E/ECWA/NR/9, October 1977

3/ 36 pages; E/ECWA/NR/3/Rev.1

The field missions consisted of experts from ECWA as well as of experts from ALECSO, CAEU, FAO, ILO, UNCTAD, UNESCO, UNIDO and WIPO.

The missions that visited the Arab States were expected to accomplish two broad objectives:

- to present the concept of an Arab Regional Centre for the Transfer and Development of Technology to the officials they meet, and obtain their views regarding the establishment and priority functions of such a Centre;
- to acquire useful information (both in printed and verbal form) on aspects of the problems as it is presented in the Working **Paper** and as it emerged during the interagency meeting.

The two field missions began on 1 November 1977 and completed their task by 20 December 1977.[1] All Arab States were visited, with the exception of Somalia (for last minute changes in flight). A total of 203 persons were met in the different Arab States. Annex II shows a list of institutions and names of officials visited by the missions.

The two field missions met with the Consultant in Beirut after terminating their visits to the Arab States. During this meeting, the mission findings were discussed and evaluated. A detailed summary of their findings is given in Annex I.

2.3.3 A draft feasibility study on the establishment of the Arab Regional Centre for the Transfer and Development of Technology was then prepared, with the help of the Consultant, taking into consideration the findings and recommendations of the field missions. This study set forth the basic guidelines for the establishment of the Centre and contained recommendations concerning governance, management, staffing, budget, location, functions and services.[2]

2.3.4 The second interagency meeting called for by ECWA convened in Beirut between 27 February and 1 March 1978 to which, in addition to the concerned UN and Arab regional organizations, some national science and technology institutions in the Arab countries were invited.

1/ See Briefing for Missions, 7 pages, E/ECWA/NR/8, October 1977.

2/ 87 pages; E/ECWA/NR/CTT/2.

The following 22 organizations accepted the invitation and attended the meeting:

United Nations Organizations

Economic Commission for Africa (ECA), Food and Agriculture Organization (FAO), International Labour Organization (ILO), United Nations Conference on Trade and Development (UNCTAD), United Nations Development Programme (UNDP), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Environment Programme (UNEP), United Nations Industrial Development Organization (UNIDO), and World Intellectual Property Organization (WIPO).

Arab Regional Organizations

Arab Fund for Economic and Social Development (AFESD); Arab League Educational, Cultural and Scientific Organization (ALECSO), Council of Arab Economic Unity (CAEU), Federation of Arab Scientific Research Councils (FASRC), Industrial Development Centre for Arab States (IDCAS), and Islamic Development Bank.

Governmental Organizations

Abu Dhabi Fund for Arab Economic Development, Academy of Scientific Research and Technology (Egypt), Centre for Scientific Research and Studies (Syria), Foundation of Scientific Research (Iraq), National Council for Scientific Research (Lebanon), Royal Scientific Society (Jordan), and Saudi Fund for Development.

The second interagency meeting discussed the draft feasibility study and recommended the revision of the study taking into consideration the relevant views and recommendations contained in the Report of the Meeting.[1]

2.3.5 The First Revised Draft Feasibility Study was prepared shortly after the meeting, taking into consideration the recommendations of the meeting.[2]

2.3.6 Following contacts made with the secretariat of the League of Arab States and in agreement with H.E. the Secretary General of the League of Arab States, ECWA extended invitations to all Arab governments and concerned Arab regional organizations to send representatives at ministerial level and at the level of heads of Arab organizations, whenever possible, to a joint meeting to be held in Amman, between 16-18 September 1978. Delegates from the following Arab States attended the meeting: Bahrain, Democratic Yemen, Egypt, Iraq, Jordan, Kuwait, Morocco, Oman, Qatar, Kingdom of Saudi Arabia, Sudan, Syrian Arab Republic, and the United Arab Emirates. Representatives of the following Arab organizations were also present: Abu Dhabi Fund for Arab Economic Development, Arab Centre for the Study of Arid Zones and Dry Lands, Arab Labour Organization, Arab League Educational, Cultural and Scientific Organization, Arab Organization for Standardization and Metrology, Arab Planning Institute, Arab Telecommunications Union, CASTARAB, and the Federation of Arab Scientific Research Councils. The participants discussed the First Revised Draft Feasibility Study, made a number of comments and suggestions on it and adopted unanimously a resolution in which (i) they noted with appreciation and satisfaction the participation of Arab governmental and international organizations and bodies and the field mission that visited the Arab countries during the preparation of the study, and (ii) recommended in principle the establishment of the Arab Regional Centre for the Transfer and Development of Technology, taking into account the First Revised Draft Feasibility Study under consideration, the observations expressed in its regard and other alternate Arab efforts in this arena, with the purpose of arriving at a unified project agreed upon by the Arab States. (The full text of the resolution is given in Annex IV). The views and comments of the participants are contained in the report of the Joint Meeting of Representatives of Arab Governments and Arab Regional Organizations on the Arab Regional Centre for the Transfer and Development of Technology.[1/]

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[1] Report of the Second Interagency Meeting on the Arab Regional Centre for the Transfer and Development of Technology, E/ECWA/NR/CTT/3.

[2] First Revised Draft Feasibility Study for the Arab Regional Centre for the Transfer and Development of Technology, E/ECWA/NR/CTT/2/Rev.2.

2.3.7 Shortly after the above meeting, the First Revised Draft Feasibility Study and the Report of the Joint Meeting were presented to a meeting organized by the Euro-Arab Dialogue Unit of the Arab League between 21-22 September 1978 on studying the possibilities for Euro-Arab co-operation in establishing the Arab Centre for the Transfer and Development of Technology. The meeting noted with appreciation and satisfaction the complete agreement on the objectives and functions of the proposed centre between the proposal of the Arab side of the Euro-Arab Dialogue and ECWA's proposal as stated in the First Revised Draft

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[1/] Report of the Joint Meeting of Representatives of Arab Governments and Arab Regional Organizations on the Arab Regional Centre for the Transfer and Development of Technology, E/ECWA/NR/CTT.3/6.

Feasibility Study. The meeting also stressed the Arab nature of the proposed regional centre and recommended to the General Arab Committee of the Euro-Arab Dialogue to reconsider its resolutions (Tunis, February 1977 and Brussels, October 1977) on this subject. It further recommended that the European side be invited to express its opinion on co-operation in establishing the Arab Regional Centre for the Transfer and Development of Technology on the basis of ECWA's Second Revised Feasibility Study which will take into consideration the resolution and comments contained in the final report of the Joint Meeting of Representatives of Arab Governments and Arab Regional Organizations as well as the studies and reports prepared in the context of the Euro-Arab Dialogue and the observations made on the subject during this meeting. (The report of the meeting including its recommendations is given in Annex V.)

2.3.8 The First Revised Draft Feasibility Study and the Report of the Joint Meeting of Representatives of Arab Governments and Arab Regional Organizations and of the Euro-Arab Dialogue Unit of the Arab League referred to in 2.3.7 above were submitted to ECWA's fifth session for discussion. The comments and observations of the participants are contained in the report of the Commission to the Economic and Social Council of the United Nations.[1]

2.3.9 The Commission adopted at its fifth session resolution 61(V) entitled "The Arab Regional Centre for the Transfer and Development of Technology" in which it:

(1) Decided in principle to establish the Arab Regional Centre for the Transfer and Development of Technology.

(2) Requested the Executive Secretary to prepare a Second Revised version of the Feasibility Study taking into consideration the comments made on it by the fifth session of ECWA.

(3) Requested the Executive Secretary to contact the Secretary General of the League of Arab States for the purpose of submitting the Second Revised version of the Feasibility Study to the Economic and Social Council of the League of Arab States for discussion and adoption.

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[1] Report of the Economic Commission for Western Asia to the Economic and Social Council of the United Nations, E/ECWA/72.

(4) Requested the Executive Secretary, following the approval of the feasibility study by the Economic and Social Council of the League of Arab States, and in co-operation with the secretariat of the League of Arab States, to invite the Arab governments, regional Arab organizations and the Economic Commission for Western Asia to a meeting for the purpose of taking the necessary measures to set up the Arab Regional Centre for the Transfer and Development of Technology.

2.3.10 It is in the context of the implementation of the above resolution and in particular operative paragraph 2, that the present version of the feasibility study has been prepared. (The full text of this resolution is given in Annex VI).

3.0 Background Information [1]

The need to acquire, transfer, absorb, develop, diffuse and adapt technology goes back in some Arab States to the early years of the nineteenth century. Muhammad Ali in Egypt, Amir Abdel Kader in Algeria, the Porte in Istanbul and Sultan Sa'id of Oman were all engaged in various ways and on different scales in the process of technical change. Muhammad Ali's efforts were on a large scale, involving thousands of foreign technicians, the use of foreign study and travel to Europe by Egyptians. Educational and training institutions were established; new agricultural methods were adopted; extensive irrigation projects were undertaken. But these promising beginnings were either stopped or severely curtailed by the wave of European imperial interests that overrode most of the Arab world shortly thereafter; by the early part of the twentieth century, most of the Arab world was under the occupation, military, naval or otherwise, of Britain, France and Italy. Each country pursued a developmental path dictated by the colonial power dominating it, and the economy of each State became gradually integrated into the economy of a foreign power.

During the post World War II period, the Arab States, except for Palestine, secured their independence. The liberation from direct military and political domination was followed by the desire to seek the liberation of national resources still entangled with foreign powers. It was the nationalization of the Suez Canal in 1956 and the subsequent nationalization of petroleum resources that gave the national governments control over their resources.

During their immediate post-independence period, most Arab countries resumed governmental concern for development. Although considerable technical, educational and economic change took place, they were generally on a modest scale, affecting only a minor portion of the population. Furthermore, their respective economies were delimiting factors in the developmental process. With the increased oil revenues of the past decade, however, most Arab States now generate adequate financial resources for self development. In addition, a number of Arab development funds have been established either by a single Arab State (e.g. Kuwait Fund for Arab Economic Development) or collectively by several states (e.g. Arab Fund for Economic and Social Development) to provide financial aid to those countries that need it.

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[1] The use of some key words and the organization of some functions in this draft report are substantially different from what appears in the original draft. Every effort is here made to present a self-contained study.

Arab governments today find themselves burdened by the tremendous backlog of unsolved problems in various sectors including rural environment and education. Thus, despite the efforts deployed during the past two decades to establish modern industries; hospitals, agricultural projects, railways, roads and universities, numerous and complex developmental problems still exist.

Naturally, the solution of any one of these problems involves the use, directly or indirectly, of technology. Throughout the Arab World, there has been a steady demand for factories, machinery, irrigation systems, dams, power stations, cars, tractors, etc. Although one notes significant changes, the high rate of population growth (some 2.9 per cent annually) has significantly increased the demand for food, health, transport, employment, and housing; thus the overwhelming majority of the Arabs continue to live in poverty.

All Arab States depend to a great extent or exclusively on industrialized nations for their supplies of technical know-how, patents, technical management and technical innovations. The current practices and systems for these supplies leave the industrialized world still in a powerful and dominant position to influence technology transfer, the channels of which are largely controlled by them.

Trade structures in the region indicate that the Arab World as a whole has still a long way to go and change from the traditional pattern of over-reliance on exports of predominantly primary commodities (oil, agriculture, and mineral products) and the almost complete dependence on imports of plant, machinery and basic equipment.

Most Arab States have expressed a keen awareness of some of these problems. Attempts to modernize bureaucracies, economic development and educational systems may be seen everywhere. The five Arab funds established to provide financial and technical assistance, OAPEC efforts to contribute to the development of an Arab petroleum and petro-chemical industry and the RABAT CASTARAB declaration of 1976 all reflect efforts, aspirations and trends.

3.1 Technology Transactions in the Arab World

The Arab States today, to varying degree, are and have been for some time engaged in contracting with international engineering firms for the execution of projects in civil engineering, industrial, petroleum, power, chemical transport, defence, and agricultural sectors. Unfortunately, there are no comprehensive compilation of information on these projects, their scale or their cost. For this reason, a brief assessment shall be presented.

In general 90% or more of all major development projects are designed and executed by foreign contractors, from the SUMED pipeline in Egypt, the Aswan High Dam, the Greater Mussayab Project, dams in Iraq or Algeria, the Haradh agricultural scheme in Saudi Arabia, the new Saudi Arabian Eastern industrial complex, to airports, airlines, airforces, new schools and housing projects.

For the sake of precision and illustration a brief review of the behaviour of Arab States in the petroleum and petrochemical fields will be presented.[1]

A study of the petroleum and petrochemical sectors in the Arab world during the period since 1959 shows that more than 600 large and small projects were executed in the Arab world, Table 1 shows their distribution throughout the Arab States. Amongst these projects one finds: Production units for urea, ammonia, nitric acid, oil refineries, LNG plants, polyethylene plants, catalytic reformers, LPG plants etc. These projects were designed by 83 different firms: 17 of these firms designed 67% of the projects; 14 other firms designed 16%, and 52 (an average of 2 projects per firm) designed the rest. In a substantial number of cases, the engineering and construction of the plant were undertaken by the same firm. But in more than 95% of cases the projects were fully planned and executed by international firms in a technology-free transfer process.

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[1] For more details, see A.B. Zahlan, "Established Patterns of Technology Acquisition in the Arab world", in ECWA Seminar on Technology Transfer and Change in the Arab World, A.B. Zahlan (editor), Pergamon, London (1978).

Although investment in oil refineries, petrochemicals and fertilizer plants and gas facilities during the 1975-1980 period in the Arab world is estimated at $67 billion, the quantities of chemicals that will reach Europe from the Middle East manufacturing centers by 1985 will be slight and even by 1990 they will be below 10% of the market.[1]

Another aspect of petroleum and petrochemical projects now underway in several Arab States is their high costs. It is estimated that plants cost 30% to 100% more than if they were to be executed in Europe or in U.S. The elevated prices are due to the need to import labour, supplies and equipment[2] and the generally weak technological and industrial base of these countries. These amazingly high costs could only be brought down by extensive programmes to develop manpower and the industrial base.

A second related activity, pipelines and gas collections, is alsoon a large and gigantic scale. The overall expenditure of Algeria,on pipelines and cryogenic facilities for LNG will exceed $ 21 billion by 1985.[3] The Saudi gas collection project is expected to cost $ 16 billion. This project alone calls for some 20 million tons of steel, these are scheduled to be delivered at the rate of 28,000 tons daily for a period of two years. The scheme involves some 800 miles of 16 to 48 inch diameter tubing.[4]

Numerous other examples may be presented such as Sumed, The Dhahran Yenbu' 48-inch pipeline and gas collection, storage and gas liquification in several Arab States. The annual rate of expenditure on this aspect of the petroleum industry is probably in the range of $ 10 billion.

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[1] Martin Quinlan, "Markets for Middle East Producers", Petroleum Economist, April, 1977, p. 125.

[2] David M. Wallace, "Saudi Arabia building costs", Hydrocarbon Processing, November 1976, pp. 189-196.

[3] Margaret Greenhalgh "Debts mount as doubts arise over long-term LNG markets", MEED, Vol. 13, pp. 55-6, 1977.

[4] Bart Collins, Middle East plans are geared to big budgets, high prices, The Oil and Gas Journal, pp. 77-101, July 19, 1976.

Number of new projects each year cited by Hydrocarbon Processing[1/]

Year	Egypt	Algeria	Iraq	Jdn.	Kwt	Lbn	Libya	Maurit.	Morocco	UAE	Qatar	Saudi Arabia	Sudan	Syria	Tunisia	Total
1976	6	11	12	2	8				7	4	2	14		4		70
1975	13	24	5	1	4		19	2	4		6	17		4		99
1974	2	11	1	9	6		13	1	1	2	1	3	2		1	53
1973	4	14	1	2					4	10		1	1		1	38
1972	2	6	3	3	1	1	8			2	1	4		1		32
1971	23	6			3		2		6	2						42
1970	1	8	4	1	3	4	3		2			24		1	1	52
1969	4	2		3	2		5		1		2			5		24
1968			1		1							1				3
1967	17	4	2		17		3		1			5		1		50
1966	6	2	6		1	7	6		1	1		3		1		34
1965	6		1			1						3			5	16
1964	5	3	1		14	6	1					1				31
1963	9	7	2		2		1					1			1	23
1959	9		5									2		1		17
	107	98	44	21	62	19	61	3	27	21	12	79	3	18	9	Grand Total 584

[1/] Each number represents a different entry in the annual index of Hydrocarbon Processing. The data for the years 1960-1962 is very incomplete, hence no entry for those years in table. The entries refer to a wide variation in type and size of plants.

At this point, it must be emphasized that a general pattern through which the petroleum, petrochemical and other industrial projects are executed bears no relation to the transfer of technology, local procurement and employment. It is, for example, estimated that the current projects in petroleum gas collection and pipelines will require some 40 to 50 million tons of steel over a three-year period. The production of this steel and its manufacturing into tubing and other components should create some 6 to 7 million man-years of employment.

In a study of the records of the (U.K.) Association of Consulting Engineers (A.C.E.) it was shown that during the period 1958 to 1976 the value of contracts in the hands of A.C.E. members increased from £141 million (1958) to £ 14,400 million (1976). This represents a 100-fold increase.[1] These figures refer to the cost of the projects to the Arab States and not to the receipts to the British economy. Some of the projects are designed by British firms and executed by non-British contractors. The fraction of the cost spent in the contracting country varies enormously from project to project. For example, in projects involving considerable equipment and supplies other than stone, sand and cement much of the cost is spent abroad.

Civil engineering accounts for a large fraction of A.C.E.'s projects such as airport, drainage, sewerage, refuse disposal, harbours, docks, sea defence works, irrigation, land planning and development, roads, bridges and tunnels. The cost of these projects added up to £ 8,234 million (some $ 16 billion) in 1976. Most, if not all, of this type of work is classical and based on textbooks principles and slowly changing technologies. These figures of A.C.E. exclude the considerable number of military projects - harbours, airports, bases, hospitals, etc. The cost for these projects is generally not known.

What is particularly striking in the Arab pattern of international contracting in the civil engineering sector (as indicated briefly above vis-a-vis Arab A.C.E. contracts) is the fact that the bulk of the projects are in areas of long established technology. It must have been evident in 1858 or 1958 that the need of the Arab States for this type of engineering was enormous and continuing. Yet there is no evidence that any effective measures were taken to train and equip Arab institutions and manpower to cope with a demand that was growing at a fairly high rate.

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[1] A comprehensive study of the history of civil engineering projects in the Arab World since 1800 is presented in A.B. Zahlan, History of Technology in the Arab World since 1800, (forthcoming). See also, A.B. Zahlan, "The Technological Dimension of Arab Economic Integration" in Strategy for Arab Economic Integration, Burhan Dajani et al. A study for the Arab League, 1978. Henceforth referred to as Zahlan/Arab League.

When one remembers the total dependence of the Arab world on foreign sources for its defense equipment (some $10 billion annually) and the fact that some 50% of Arab food supplies are imported, the volume of transaction in technology products and supplies is considerable. Of course, all numbers are only approximate, but the important point here is to acquire an understanding of the scale of these transactions and the implications of such patterns.

In order to understand the magnitude of the above figures, it may be worthwhile to note that in its fourth Five Year Plan (1972-1976), the People's Republic of China spent $2 billion on complete plants and some $2 billion on large equipment[1] or, less than $1 billion per year, or $1 per capita per year. By contrast, the Arab world equipment imports is about $250 per capita per year.

If one compares the volume of engineering contracts in the Arab world with corresponding economic activity in the U.K. and the U.S., one finds that the value of the activities in the Arab States is greater than in the U.K. and less than in the U.S.[2] Thus, Arab international transactions are comparable with the scale of economic activity in major industrial powers.

3.2 Some Implications of Prevailing Technology Transactions

Some of the projects in the Arab world are among the largest in the world, yet they generate little employment for Arab manpower. Arab States seek to import "advanced technology" - plants considered in the West as utilizing recent technical findings - yet many of these plants are operated far below their design capacity.

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[1] Science and Technology in the People's Republic of China, OECD, Paris, 1977, p. 45.

[2] Zahlan/Arab League, op. cit.

Most major industrial installations in the Arab world are conceived and constructed by foreign firms as foreign enclaves. Few of these installations have developed forward and backward linkages with other industrial and economic activity. The specific Arab State, or the Arab world as a whole does not therefore acquire appreciable know-how when a contract is completed: the maintenance, modernization, or duplication of the installation often calls for new contracts with international firms. Furthermore, in the past three decades a large number (possibly 100,000) of trained engineers have graduated from universities whose adequate placement may have filled a gap and contributed to a substantial tradition in public and private consulting and contracting firms. Yet the volume of foreign contracts in these domains has increased some 100-fold in the past 20 years.

The pattern utilized to execute these projects involves financial cost and loss of employment opportunities. All these projects involve huge supplies of materials (iron, steel, cement...) and equipment (distillation towers, valves, pumps...). The production of the materials, supplies and equipment for the petroleum and petrochemical projects in progress created jobs for millions of workers in advanced countries. On the other hand, the loss of employment generated by current food imports have incalculable manpower and unemployment implications in the Arab world. Of course, the Arab States - singly and collectively - cannot instantly alter this state of affairs. But, a great deal can be done within as short a period as 3 to 5 years.

Another extremely important issue is the cost and pricing of contracts. There is considerable evidence that the cost of projects executed in the Arab world may be as much as three times higher than the cost of similar projects executed elsewhere. Very fragmentary information is available about the cost structure and the factors contributing to these high costs. Frequently, the operating cost of plants, and thus the unit production cost, is also high.[1]

Naturally, industrialization cannot be said to occur when the transfer of capital goods is technology-free, when the cost of the installation is higher than the cost of similar plants elsewhere and finally when the plants are operating at a loss and far below capacity. This, for example, is the case of the fertilizer industry in the Arab world. A recent IDCAS study found that these installations, except for Kuwait were operating far below capacity and at a loss.

Table 2

Operating Efficiency of Arab Nitrogen Fertilizer Plants

Country	Operating level as per cent of capacity		
	1974	1975	1976
Algeria	8	8	8
Saudi Arabia	49	61	63
Syria	56	59	57
Iraq	59	50	54
Qatar	37	41	52
Kuwait	84	86	83
Egypt	65	69	78

Table 1 in ص/٢/أح/١ , p. 9 in "Arab Co-operation in the development of the Arab Chemical Fertilizer Industry", an IDCAS working paper presented at the Second Meeting of the Arab Ministers of Industry, Tunis, 8-13 November 1977.

So far, the emphasis of the discussion has been placed on the scale and nature of the international transactions in the field of engineering and contracting. But, one could also examine events and processes in which the elements of development are of greater importance than that of transfer. Two of many such examples will be mentioned.

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[1] See, for example, Omar Grine "Transfer of Technology in the Arab Steel Industry" in ECWA Seminar on Technology Transfer and Change in the Arab World. A.B. Zahlan (ed), Pergamon Press, London (1978), Also, David M. Wallace, "Saudi Arabian Building Costs", Hydrocarbon Processing, November, 1976, pp. 189-196.

There already exists a large variety of technologies in the region, much of these have originated in the area, while others are of more recent acquisition. Yet the geographical diffusion of these technologies within the same country or throughout the region is slow.

The study of the impact of economic or technological changes on technologies in use or being acquired should also be the subject of careful study. For example, the recent increase in the cost of energy had dramatic effects on the cost of agricultural products. The mechanization of agriculture and the intensive use of fertilizer are to a large extent energy dependent: in some advanced countries 5 calories of energy are expended per calorie of food produced. Furthermore, there is considerable difference in the "petroleum" energy ratio $\left[E_R = (\text{Energy Out})/(\text{Energy In})\right]$ of different food products and different styles of agriculture. The energy ratio for cassava is 60 to 70; for potatoes, barley, wheat, maize and sugar beet, it is 1 to 4 for US and UK production; for 1968 UK agriculture it was 0.35; for UK broiler poultry it is 0.1; and for various fishing fleets it is 0.01 to 0.05. [1]

If one were to examine agricultural output per total energy input (inclusive of the food requirements of the farmer), the use of dung as a fertilizer, etc., one would find US/UK agriculture to have low energy productivity while Japanese and traditional forms exhibit a better energy performance. All Arab States today are endeavouring to transform their agricultural sector and thus it would be of vital importance to plan this agricultural strategy in the light of expected energy cost in years 2000 - 2050. Naturally, this is only one of the factors that has technology impact; others such as land and population are also relevant in these technology choices.

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[1] G. Leach, *Energy and Food Production*, International Institute for Environment and Development, Washington, 1975.

4.0 Institutional Infrastructure in the Arab World

The 21 Arab States exhibit a large variety of social and economic conditions. Yet in all of them there exists tendencies towards central development planning. In some, such as Egypt and Iraq, the exercise of development planning is more than twenty years old while in others it has yet to take a mature form. Governments generally pursue three broad economic objectives: diversification of the economy, the rational exploitation of the national natural resources, and raising productivity levels. The attainment of these objectives calls for greater attention being given to the technological dimension of policies and to the national instruments for pursuing the objective.

In a recent ECWA publication, considerable attention was focused on the limited capacity of the Arab States in Western Asia to engage in the development and adaptation of technology.[1] Considerable evidence was presented in support of this conclusion. Briefly these limitations were manifested in the near total absence of R & D efforts devoted to technology, the few national consultancy firms dealing with technology analysis, identification, adaptation and development. Except for Egypt, similar conditions prevail throughout the Arab States of North Africa. Although in Egypt activities in these fields are more extensive than elsewhere in the Arab world they still fall short of meeting national needs. The mounting and large-scale dependence on international contracting is, of course, another manifestation of this phenomenon.

Most countries have revised the need to assess the level of their technological development as a major aspect of higher production. More importance was placed on the performance of technological instruments which had been formulated. The following represent a summary of relevent activities.

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[1] The Status of Science and Technology in the Western Asia Region, prepared by ECWA NRST Division, 89 p., E/ECWA/NR/SEM.1/18, September 1977. To appear in ECWA Seminar on Technology Transfer in the Arab Middle East, op.cit.

4.1 Planning and Policies

Many of the existing development plans in the Arab world represent a variety of, and a differentiation in approach towards science and technology ranging from a mere reference to science and technology targets included in the objectives of national development to specific activities to across the board science and technology planning functions. However, with very few exceptions national plans do not include separate chapters dealing with the application of science and technology as an integrated component of the national development programme. In another word the links between technological objectives and socio-economic objectives have not yet been established.

Technological development has not yet been properly institutionalized in the Arab world. However, few countries dispose over science and technology bodies which have one or more national functions related to the promotion of science and technology. The history of many of these institutions reflect their still continuing experimental character as manifested in their constant changing status and the re-organization they have been subjected to.

Feeling the implication of their dependence on the outside market for the supply of goods and technical services, some Arab countries adopted certain policies through which these goods and services could be controlled and used to upgrade local technical capabilities. However, in most cases, these policies remain in the form of uncoordinated fragmented activities with minimum correlation to technical resources or functions of related sectors.

In countries with a pre-dominant private sector technology transfer mode is commercially motivated, although the governments are increasing their role in effecting the transfer. However, there are no well-defined overall policy or guidelines for regulating and managing technology. The only broad policy instrument which has some limited bearing on technology is the one dealing with investment procedures and contracting activities, i.e. guidelines for pre-investment considerations etc.

Although some governments recommend that foreign companies should co-operate with local firms, there is no evidence that this move has led to a growth in technical capacity to undertake project works. In many cases this move may have served only the commercial interests of local firms. It is generally felt by engineering circles in the region that the procedures and conduct for contracting out of internationally financed projects need to be reviewed. In the opinion of these circles, satisfactory project implementation is the major criterion governing the awarding of contracts. Overall development in terms of capacity growth in creating complex projects is very often overlooked in the process of awarding contracts.

4.2 Research and Development (R&D)

The oldest form of research in most Arab countries has been that of the agricultural experimental and extension stations. Industrial research, on the other hand, has not yet been well-developed as an important tool for commercial purposes.

Other forms of research have been pursued at different academic institutions in some countries. But most of that form of research has been of a basic, or theoretical, rather than being of an applied or commercialized nature.

R&D has not been developing alongside the tremendous exponential growth experienced in technology import. Most industrial research institutes in the Arab world perform marginal roles with regard to product development, and have confined their activities largely to industrial research studies and industrial testing. On the whole, product (technology) development is only in the experimental stage, implying that dependence on foreign design and blue print will continue for a while.

A number of Arab governments have allocated some human and financial resources to build up technological research capacities. But it is only occasionally that such capacities were deployed to undertake contract research and development for private or government production sector. More often simple techniques well within domestic R&D and engineering capabilities are purchased from abroad. To some extent this reflects the lack of confidence in domestic capabilities.

The average expenditure on R&D in the Arab world before 1975 was one of the lowest in the world and is barely 50% of the Third World average of $ 2/ capita-year[1/]. Since then a few Arab states have increased their R&D allocation bringing the average for the Arab world in 1978 to a level of $ 2/capita-year. Although one does find variations from one Arab State to another, the effort is very limited. Around 300 to 500 R&D units already exist throughout the Arab world. Few are as large as the National Research Centre in Cairo. Many are very small units attached to ministries or operating production plants. On the whole, some R&D infrastructure already exists although it requires considerable development and expansion.

4.3 Patents, Licences, and Intellectual Property

With the overall low level of R&D activity, it is not surprising that only few technology inventions emanate from the Arab world.

Information on patents and the administration of patents in the Arab countries is very limited. It could not be ascertained that in any of these countries the collection, classification and analysis of patent data required for assessing the operation of the international patent system as a whole, has been undertaken systematically in depth. Some countries do not even have as yet their own national patent laws.

Few countries have or are in the process of establishing institutions or procedures for patent documentation. In most cases, it appeared that the collections of patents describing technological advances in the existing state of the art (and thus constituting a highly valuable part of the information exchange

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1/ The estimate is based on statistics published by UNESCO, for the Arab States, the CASTARAB figures have been used.

mechanisms) are very rarely consulted by national investors (public and private). A good portion of these collections are classified according to various local systems and not on the basis of the international classification.

Although some Arab States possess a capacity for the monitoring of the licences they are party to, no reliable information is available on fees and royalties paid by the Arab world on information concerning the legal status of these licences.

The national institutions entrusted with the administration of industrial property have traditional functions, namely; acceptance of applications for protection, formal examination as to the legal requirements, grants and administration of granted titles of protection. None of the institutions referred to proceed to examination pertaining to the novelty, inventive activity and industrial application ("examination as to substance").

Most of the national institutions entrusted with industrial matters have no direct concern with licence agreements and usually are not effective in providing information on available technology or in assisting possible national investors in negotiating contracts.

As regards promotion of inventive activity, some countries have taken measures in this respect. But, only few have adopted a system for the promotion of innovations, both in the public and private sector or have a legislation on the protection of trade works and inventions.

4.4 Project Development, Consultancy and Design Activities

The preparation of projects for both national and international contracting rarely gives due attention to the technological dimension. Furthermore, most large projects are executed through the turn-key formula and rarely involve national institutions in the design or planning phases.

Although efforts are being made to build up indigenous adaptation capabilities in few sectors, there is still almost total reliance on material and design transfers from outside. In most cases, much of the technology is introduced in a package form constituting not only finished products (or plants), but also embodying the work that has gone into its design, selection of parts, processes, procurements, errection and commissioning. Very few countries have an appreciable capacity in these areas at present.

At the present, there are only few national or Arab establishments or firms which undertake the multitude of consultancy functions carried out by similar organizations and companies in the developed countries. Consultancy as a technology transfer channel has been confined to transfer, with development, including training playing a minor role.

In many Arab countries, instruments for the selection and proper use of technology have been developed. Some of these instruments promoted the development of national technological capabilities of a general order to deal with various phases of project development, e.g. preparing pre-investment studies, evaluating project proposals, negotiating contracts, following up some procurement and construction activities, trouble-shooting, etc. But even in the most advanced of the Arab countries, reliance on foreign consultancy, particularly for detailed studies and engineering design and management continue to be a prevailing character.

Considering the availability of engineering manpower in some Arab countries the question raises whether such dependency purely emanates from "capacity shortage" or whether other factors perpetuate dependency in this area. There are sufficient indications that social factors such as confidence in local/national companies and lack of incentives play important roles.

In a number of Arab countries, development projects are executed by direct investment activities of enterprises from industrialized countries either independently or by forming joint enterprises operating under licence. Usually the management and operation of these enterprises are controlled by the mother company who may impose certain restrictions including limitation of export markets; adaptation and utilization of improved technology, R&D activities, use of raw material, etc.

4.5 Training and Education

In the domain of manpower and training one observes a constant expansion in the scale and allocations at all levels of the educational system in virtually all the Arab States. However, limited attention has so far been given to the training and development of the highly specialized manpower required to plan, design and execute the type of projects the Arab States are committed to. Some Arab States are able to provide the skilled manpower required to operate the new facilities once established, while others depend to a considerable extent on expatriate manpower. No Arab State is capable of providing the full technical services to maintain and develop its telecommunication system, its hotel industry, its railways and road systems, airports, harbours or industries.

The development of technical education has been receiving increasing attention. But it is doubtful whether the efforts being made are commensurate with national or regional manpower requirements. Thus the continued dependence on foreign expertise is a consequence of a lack of appropriate institutions.

In general, the educational programmes in all countries have been of a traditional academic nature and in most cases leading towards a university degree. Only in few countries a serious approach is made for the integration of manpower and skill development in the socio-economic planning machinery. In the others, some attempts are being made to provide for the development of local skills through uncorrelated training and educational programmes and facilities.

The Arab States devote a notable portion of their development budget for educational and training institutional set-up, but with no detailed analysis of the planning procedure in identifying the technological aspects and implications. Some countries have established educational councils as a policy making body among whose other responsibilities is the supervision and co-ordination of training and/or placement of skill.

Very few countries are known to have undertaken a comprehensive survey of their national scientific and technological potentials. In most cases where surveys had been carried out, scientific and technological activities were only partly covered.

The spectrum of scientific and technological development in the Arab world include few least-developed countries like P.D.R.Y., Y.A.R., Oman, Djibouti, Somalia and Mauritania which are at a take-off level with very small stocks of scientific and technological manpower as well as countries with modest and well-developed scientific base like Lebanon. However, internationally compared, the Arab world occupies an above-middle position among developing regions with a ratio of 800 scientists/engineers per 100,000 population, which is still below the fairly selected target of 1000 for the developing countries.

Some of the Arab countries have a diversified scientific and technological infrastructure, yet they are far away from what is considered an adequate scientific and technological base for further development.

In many countries, although financial resources are available, the absorptive capacity for scientific and technological activities is limited. Furthermore, most countries are experiencing increasing difficulties at the technician level; a phenomenon that can hinder the development of a proper technological base.

Continued brain drain from the Arab world to Europe and the U.S.A. is a result of institutional underdevelopment. Much of the technical manpower shortage could probably be alleviated if the region were to possess an institutional capacity to plan training programmes on the scale and quality needed. Here a vicious cycle can be noted: institutional limitations sustain technical manpower shortages and limit national capacity for technical planning, engineering design and contracting; the latter limitation leads to extensive dependence on international contracting; this dependence on international contracting bypasses national institutions and stunts their growth which in turn result in a brain drain. However, opportunities for interrupting this process exist.

4.6 Information Services

In the field of information two ECWA studies [1] and [2] have emphasized the limitations of the existing systems. Attempts to overcome these informational constraints are being made; but again the current efforts are not matching the requirements of the development plans and projects in the region. One finds that few national institutions utilize the available international and foreign sources of information. However, the linkages with international and regional systems are still weak.

The most noted aspect of information development in the area has been the weak arrangements to handle information on availability, suitability and cost of technology available in the industrialized countries.

Some countries have taken the initiative to develop information services using modern data storage and retrieval equipment. However, in most cases the institutional development of information has not been based on a comprehensive survey of existing facilities in the region. Furthermore, the dissemination function of the few specialized technological information centres has been minimal. The problem seems to be one of policy and lack of identification of information needs.

4.7 Standards and Quality Control

Most Arab countries took serious steps towards organizing measurement and specification standards. Except in few areas, the efforts have been of limited success.

Reliance on foreign standards brought about a hotrogeneous collection of codes within each country, which need to be filtered and adopted. Some efforts on a national and regional level are being pursued to unify standards in major sectors. But the enforcement policies are still missing.

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[1] Draft Feasibility Report on establishing a Regional Documentation Centre at ECWA for the Economic and Social Sciences, unpublished document prepared by ECWA, November 1976.

[2] A study and assessment of information resources in selected developing countries of the ECWA region (E/ECWA/NR/2), prepared by the Natural Resources, Science and Technology Division of ECWA.

Quality control of locally produced goods are being pursued by specialized units of some major companies, particularly those who seek export. Few countries have established a centralized system for quality control of locally manufactured and imported goods such as foodstuff and pharmaceutical products.

Traditional technologies generally receive marginal, if any, attention. Traditional modes of transport, construction, agriculture, health services, marketing and storage, can all be improved with modest resources. The majority of Arab society utilizes and will continue to utilize traditional technologies for decades to come. Thus it is most important that technological problems of the traditional sector be attended to.

Regional and pan-Arab level cooperation and collaboration in the field of science and technology has not been extensive. The little cooperation that existed so far has been pursued by a variety of institutions along different formulae, i.e. participation in regional projects, joint venture-projects between certain states, technical assistance extended by one state to another, joint projects between institutions (e.g. universities) etc. The most visible manifestation of regional cooperation is found in the establishment of specialized regional institutions in various realms of development for different purposes (training, services, research and science and technology).

It is the conviction of some government officials and professional circles that regional activities and/or cooperation carried under the present cooperation formula has had limited effect on the promotion of indigenous capacity.

5.0 Assessment of the Need for an Arab Regional Centre for the Transfer and Development of Technology

The transfer of technology from industrialized countries to Arab countries can be viewed to cover the transfer of those elements of technological knowledge which are normally required in setting up and operating new production or service facilities or extending existing ones. In its broadest sense this process involves (i) transfer of materials; (ii) purchase of machinery and equipment; (iii) transfer of designs, blueprints, technical literature and/or (iv) transfer of a technical capability permitting production and/or adaptation.

In section 3.0 it was shown that the Arab States are securing the services of international firms for the execution of projects on a very large scale. It was also noted that the cost of projects is fairly high and the extent to which these projects are integrated in the national economies is also very limited. In fact, most projects persist as isolated enclaves. The performance of many of them after completion is often below expectation.

In order for the Arab States to derive greater benefit from these expenditures they will need to develop efficient and effective institutions, policies and manpower to plan and manage these processes.

Section 4.0 showed that a number of Arab countries have adopted (or are intending to adopt), science policy formulation and planning in one form or another as instruments and tools to accelerate and effect development and plan implementation. Most countries are still in a very preliminary stage of science and technology planning integration. No full-fledged science and technology plan has yet been formulated and most governments are still searching for the right location of overall science and technology planning functions.

This has created a mounting consciousness that international technology transfer to the Arab world needs to be viewed both as an instrument for attaining the general objective of reducing technological dependence and, as a catalyst for accelerated growth and indigenous technological development. Hence, more and more the view is expressed that the transfer, development and adaptation of technology needs to be programmed and regulated if indigenous technological development is viewed as the overall objective of a self-reliant strategy of development. A capacity to handle imported technology from source via channels to users is a *sine qua non* for the development of an indigenous technological capacity.

A reduction in external dependence appears difficult to achieve if not impossible over the next decades, since present trends indicate growing technology dependence. The reversal of external dependence, if at all possible, is an extremely slow process. Acceleration of this reduction process will undoubtedly require an intensified usage of all channels for transfer of technology on a national and a regional level.

Up till now no regional co-operation in science policy formulation and planning has as yet been attempted. Existing Arab specialized agencies up to present paid minor attention to the role of science and technology development in planning, or may not have so far the development capacity in this area. The existing needs in the Arab world such as the information need, the need for planning model and training could well provide the basis for co-operative action.

The philosophy underlying Arab co-operation and collective efforts in the field of science and technology is the conviction that indigenous capacity improvement can be effected through the totality of expertise and capacities in the region but which is spread over a number of countries.

Present regional Arab co-operative programmes have not taken full advantage of all possible national capacities and present formulae for co-operation have been limited and developed in one direction.

The concept of a co-operative action in the Arab world for the transfer and development of technology may be built around the principle of a network which may constitute a system for dynamic interlinking of national focal points dealing with all channels of technology transfer through a regional co-ordinating and substantive supporting mechanism to provide a two-way channel for information exchange, advisory services, monitoring, and technical assistance.

The UNCTAD recommendation which was adopted by ECWA calls for the establishment of a regional centre for the transfer and development of technology. This regional centre is to assist the individual states in coping with the problems associated with technology and the development of national centres.

In order to design a centre that is appropriate to the needs of the Arab world, ECWA called for two interagency meetings and a joint meeting of representatives of Arab governments and Arab regional organizations at which various options and possibilities were carefully discussed and examined.

ECWA also organized two field missions that visited 20 Arab States and discussed the concept and national requirements with more than 200 officials. A full report on the field missions is included as Annex I. The extensive discussions and consultations naturally led to the development of the concept as reflected in this study.

At the outset of this ECWA programme, it was fully realized that the needs and demands for services in the technological field in the Arab world were enormous. It was also realized that to supply all of them was beyond the possibilities of the proposed Centre. Thus the objectives of the missions was to contribute to the narrowing of the range of functions of the proposed Centre.

Most government officials interviewed by the missions were generally in favour of the establishment of an Arab Regional Centre for the Transfer and Development of Technology. Their support was usually conditional on the possibility of creating a centre capable of providing effective and useful assistance. There was a considerable emphasis on the following functions: policy-design, training, comprehensive information services, co-ordination and appropriate technology. The expressed demands of all parties were fully analyzed and the institutional requirements to respond to these demands were computed.

The size of the required Centre to cope with the requests was considerably greater than the size originally envisaged in the Working Paper. For this reason, two levels of activities are represented: a minimal size below which it is impossible to fulfil the desired functions and a level at which the Centre may be able to provide basic services to most, if not all, Arab States. The larger size would still fall short of the expressed demands. It might be useful after few years of the Centre's operations and in anticipation of the increasing demands of the Arab States on the services of the Centre in various specific sectors, to consider establishing specialized regional centres in different Arab countries and link them to the main regional Centre which may be responsible for co-ordinating their activities. A detailed discussion of the size of the Centre is presented in section 6.0.

It is important here to note that although Third World Countries have much in common, they also have much that is different. The strategic location, the immense natural resources, the low density of population, the high rate of population growth, the availability of considerable foreign exchange, the high volume of foreign imports of consumer and industrial products, the large diversity of social and economic systems, the existence of a number of regional institutions, the increasing rate of population mobility, the high dependence on food imports, the large and increasing migration of workers and the brain drain are striking characteristics of the Arab region. No other region combines the same factors in this same intensity. Any comparison between the Arab world and other regions of the world should be made with care. It is within these limitations that the present study benefited from the experience of other developing regions in the transfer and development of technology such as the African and Asian experiences. This was made possible through the acquisition of published reports including in some cases mission reports, and project documents on regional centres for transfer and development of technology prepared by the Economic Commission for Africa and the Economic and Social Commission of Asia and the Pacific.

5.1 Justification and Logistics

The acquisition and development of appropriate technology is the main issue which has an immediate effect on the status of socio-economic structure and development in the Arab world. It is this process and not the long process of technological thinking and appreciation on the level of the masses that is of immediate concern.

To outline the factors which formulate the logistics of having an Arab Centre for the Transfer and Development of Technology, and justify its regional character, the following facts should be considered:

5.1.1 Acceleration of national development: Policy-making in the field of science and technology depends on quantitative data and information required for analysis, planning, budgeting and decision-making. Such data are essential for identifying areas where pooling of national potentials into regional co-operative action may accelerate national development.

5.1.2 Continuous development of national technological facility: A national technological facility might be an outgrowth of particular project development, but its localized use might be extended to other parts of the Arab world where the need is only momentary, thus promoting continuous development of that facility.

5.1.3 Better bargaining position: Collective bargaining for services is as advantageous as it is for goods, and may place the Arab world in a stronger position in the revision of present transfer conducts as embodied in the current world economic order. The proposed centre could well provide the frameworks within which collective bargaining at the Arab level could be exercised.

5.1.4 Identifying technological aspects in regional technical assistance programmes: Specialized national and regional institutes in the Arab world may be involved either by providing inputs or being the recipients of services related to the development of certain sectors. The technological aspect of this transaction may be integrated with minimum awareness of its implication on the overall development of technology. A specialized regional body such as the proposed Centre may be in a better position to identify the qualified portion of that technological aspect and regulate its organic side to serve both purposes.

5.1.5 Eliminating harmful competition: National policies may need to be harmonized through the interlinking of national institutions and exchange of information to eliminate harmful competition within the Arab world, a function which can be handled by a regional centre.

5.1.6 Undertaking responsibility of filtering relevant technological information: The present volume of information related to technology is such that no single country, whatever its infrastructure, will be able to absorb it all. A regional facility like the proposed Centre could more appropriately take the specialized tasks of selecting and disseminating essentially required components to all countries.

5.1.7 Collective and individual experiences: The same technologies are sought by different Arab States. If carefully studied and properly analyzed, those diverse experiences are of direct relevance to all Arab States. The regional Centre by focusing on the experiences of the entire region places at the disposal of each Arab State a valuable body of knowledge.

5.1.8 Regional solution to national problems: A large number of technologies require highly specialized manpower and institutions. Though the national markets and the frequency of utilization of these technologies may not be adequate to sustain such institutions, the total Arab market for the services of such institutions is more than adequate. A regional Centre provides the necessary perspective to examine such areas of technology.

5.1.9 The diffusion and dissemination of existing relevant technologies: A number of Arab States have successfully acquired and/or developed a large number of technologies. Many are needed in other Arab States. A regional Centre emphasizes the increasing opportunities for internal transfers within and between Arab States.

5.1.10 The complementary nature of Arab economies: The economies of the Arab States have considerable potential for integration through their complementary characteristics. A regional Centre emphasizes these qualities and may contribute to their development.

5.1.11 The development of similar national institutions in the technical field: All Arab States during the following two decades aim to develop appropriate national institutions for technolcgioal planning, management, research and development. Thus at different periods of time each State may require advisory services in these fields. In providing these advisory services a regional Centre accumulates and develops its expertise to the benefit of the Arab world.

5.1.12 The preparation and diffusion of information on Arab R&D and related institutions: So far, the available information on national and regional institutions engaged in R&D and in technological transaction is very limited. This scarcity of information limits opportunities for co-operation between these institutions. A regional Centre should be able to provide factual, comprehensive and comparative studies of institutions, programmes and projects. Such studies should contribute to the increase of co-operative work and establish yardsticks by which to measure performance and identify bottlenecks and promising solutions.

5.1.13 Other Expected Returns:

The establishment of the proposed Centre is to operate as a non-profit institution. It is operated on a cost recovery and or grant basis. Thus, all the benefits accruing from the services of the Centre are secured by the Arab States. The cost of the Centre has thus to be compared with the resulting benefits to the Arab States - individually and collectively. In Sections 3.0 to 5.0 some of the technological problems facing the Arab States are briefly mentioned. It is clear that more effective technological policies could reduce the costs, increase performance, increase labour productivity, reduce maintenance costs, etc. The reason why the proposed Centre may be capable of making significant contributions arises from the considerable range of experience of the Arab states, past and present. Thus, the basic knowledge necessary to deduce appropriate policies and actions that may result in considerable savings may often be readily available. The environment, governance and financing of the Centre has been proposed with a view to the quality of its performance. Assuming that these proposed guidelines are adhered to, then there is no doubt but that the Centre will equal the performance of similar institutions in other societies and should result in making significant contributions far greater than its cost.

5.2 Design Factors and Limitations:

Because there already exist a large number of national and regional programmes and institutions, the design of the Centre had to be carefully formulated to avoid duplication, needless competition and friction. For this reason the proposed Centre has been designed to take into consideration past experience, to concentrate on relatively narrow and poorly served areas as well as to co-operate and co-ordinate its activities with other institutions. Some basic aspects of the proposed Centre are:

5.2.1. That its activities do not overlap with those of R&D centres and engineering firms; in fact the proposed Centre is not to be engaged in any such activity. The relationship between the proposed Centre and R&D has been examined at length in both interagency meetings and in the consultations with Arab States. In view of high cost of R&D, the growing number of national R&D Centres as well as of the nature of the required services, it was decided to recommend that no R&D activity should take place at the proposed Centre during the first three years and that the Board of Governors reviews this policy at a future date. This in no way curtails the capabilities of the Centre because it retains the ability to gain access to national, regional and foreign R&D activity through a number of mechanisms: utilizing, when the need arises, the relevant technical experts, exposing its staff to reports on relevant R&D findings through its weekly seminar series, entering into joint programmes with R&D institutions and so on. It is also useful to emphasize that the Centre is to address technological activity in its totality rather than single out the R&D component. In other words, a specific study involves the examination of the technologies utilized, economics, labour, standards, management, environmental impact and also the expected consequences of current R&D. Thus, in any particular study, R&D consideration may involve a small fraction of the entire effort. In a number of important areas, technology is changing slowly and the formulation of new policies may be only marginally influenced by R&D. The Centre is expected to integrate diverse factors that influence the execution of Arab development programmes. R&D is, of course, of crucial importance in rapidly changing technologies. When studying issues possessing this characteristic, it will become essential to examine actual and planned R&D activity in and out of the Arab world. In performing this function, the Centre will necessarily require the services of qualified researchers. The type of functions proposed for the Centre are professionally well established and are undertaken in a number of intergovernmental and national centres in advanced countries. However, the precise nature and balance of activities proposed here has been designed to fit the prevalent circumstances of the Arab States. For example, the information and extensive effort to provide highly specialized training are normally not included in the operations of such centres in advanced countries. But the new centres being established in other developing regions of the world give attention to their training and information functions.

5.2.2. That it emphasizes processes and analyses of crucial importance in technology transaction during the early phases of a concept and a project, e.g. the conceptual, pre-feasibility and feasibility study phases of projects during which technology choice, participation of national institutions, cost and transfer opportunities are determined.

5.2.3 That it emphasizes services that contribute to the development of national as well as regional institutions.

5.2.4 That its organization be built around projects. It will have no permanent technical activity. The Centre's basic goal is to assist other centres to take over whatever service it is rendering. Repeated experience in different Arab States gives the Centre unique opportunities to learn from experience and thus to transfer this expertise.

5.2.5 That it overcomes some of the criticism that is levelled against regional institutions. It is thus proposed to establish a strong, autonomous, adequately financed institution governed by a competent body of technically qualified persons. However, the ultimate responsibility for the success of the Centre resides in the hand of the Arab States, for it is they who establish, govern and have the benefit of the proposed Centre. The quality and expertise of this body will effectively determine the Centre's performance.

5.2.6 That the limitations imposed on the Centre's institutional capacities automatically force it to co-operate and co-ordinate with national and regional institutions.

5.2.7 That the mode and extent of interaction by each Arab State with the Centre is to be determined by the State itself. The governing body of the Centre is of course responsible for establishing the Centre's policies and determining the allocations of its resources.

5.2.8 That the services to be supplied by the Centre may overlap marginally with those supplied by IDCAS in the industrial field. However, the Centre and IDCAS would avoid possible duplication through co-ordination. IDCAS has, on the other hand, undertaken to study some of the areas of potential interest to the proposed Centre, but co-operation in this area should not pose any problems.

5.2.9 That the seminar and workshop functions to be provided by the Centre aim at the diffusion of the expertise acquired to all relevant quarters at an adequate rate and on a suitable level. This diffusion guarantees that the Centre will not monopolize the knowledge it acquires but will rather put it at the service of national institutions.

It is clear that the proposed Centre is now conceived of as part of a complex system although its precise relationship to each State and national institution has to evolve in due time subject to the wishes of each State and the detailed policies determined by its governing body. Because of the wide differences between Arab States it would be very unwise to enforce a standard pattern of interaction with all of them.

6.0 The Arab Regional Centre for the Transfer and Development of Technology

The extensive consultations that have been undertaken in relation to this project indicate that it is both needed and feasible. Furthermore, as has already been discussed in Section 5.0 the need is already being translated into demand.

In this study every effort has been made to focus the functions of the proposed regional Centre on priority and strategic areas that presently receive limited or no attention. The mechanisms for co-operation with national and regional institutions are such that overlap in activities may be rapidly identified.

With time, new institutions will be created and the possibility of overlap may arise; thus, it is recommended that the Centre's programme adapt themselves to the changing circumstances, always opening up new fields of activity.

At this point, it is useful to present a number of basic principles and guidelines that appear to be unanimously agreed on by all parties consulted.

1. The Centre shall serve in an advisory capacity only.
2. The Centre shall not undertake any hardware R&D programmes during the initial founding period (first three years), this policy to be reviewed at a later date.
3. The Centre should concern itself with critical and high priority problems and issues.
4. The Centre should assume an active role in the planning and selection of its programmes.
5. The Centre should not be expected to cover all fields of activity.
6. The Centre should assist the Arab States in the planning and development of national institutions for the transfer and development of technology.
7. The Centre should promote the establishment of adequate linkages between the proposed regional centre and the national centres operating in the Arab countries.

6.1 Objectives of the Centre

The fundamental objective of the Centre is to support singly and collectively the Arab States in their developmental efforts. Naturally, the contributions of the Centre will emphasize the technological dimension of the developmental programmes. Sections 3.0 to 5.0 provide a concise presentation of the type of services and areas of activities the Centre is to undertake. The Centre is just one of a large network of institutions that are directly involved in the problems of development and technology. In both the execution of its functions and in the implementation of its recommendations the Centre is dependent on the co-operation of national and regional institutions. In the following no distinction will be made between short-term and long-term objectives because an objective may be short-term for one country and long-term for another.

(i) To function as a central node in a network system linking national centres or focal points within the Arab world.

(ii) To promote the establishment of national centres, institutions or programmes concerned with transfer, adaptation and development of technology.

(iii) To facilitate the access to technological information and services located within and outside the Arab world.

(iv) To provide technical assistance in the area of transfer and technology.

(v) To promote R&D related to technology.

(vi) To assist in the training of personnel in different aspects of technology.

(vii) To promote regional and interregional co-operation in activities relating to technology.

(viii) To assist the Governments of Arab States in strengthening their technological capabilities so that these countries could promote indigenous technology development by interlinking all channels of technology transfer and making them accessable to the Arab World.

(ix) To improve terms of transfer of technologies both within the Arab world and from the outside world to Arab States.

(x) To promote the transfer of technologies developed in the Arab States.

(xi) To promote integration and harmonization in the technology field with the Arab world, and

(xii) To speed up the industrialization of the Arab States in line with the Lima Declaration on industrial development and co-operation.

Section 6.2 shall clarify in detail these objectives and provide brief illustrations of some of the possible methods and activities that may be utilized in fulfilling these objectives. In Section 7.0 specimen of possible projects are presented and these illustrate further these considerations.

In what follows the Report shall attempt to discuss the basic factors that are essential to the establishment of this institution. Institution building in developing countries is a complex and difficult activity that must be approached with considerable care and skill. It is strongly urged that the implementation of the project, if and when carried out, be executed without haste and with meticulous attention to endowing the institution with more than adequate resources to meet future crises. Once the basic objectives and functions are agreed upon, the thrust should be on the design and establishment of a powerful and healthy institution. Work programmes are of minor importance because the staff should be able to prepare more detailed and comprehensive programmes than can be done at this time.

6.2 Functions and Activities of the Centre

The recommended functions, services and programmes to be presented are the product of the extensive discussions and consultations that emerged out of the preparatory interagency meetings and the visits of the two missions to 20 Arab States. In the light of these discussions and findings the initial functions presented in Section 6.0 of the Working Paper (op. cit) have been modified in several important ways. The definition of some of the functions has been changed; the training function was moved out of the core programme (called Permanent Programme in the First Revised Draft Feasibility Study and referred to as "Planning and Services" in this study) where it would necessarily constitute a small scale activity, and included as a separate function.

In the light of the wide range of services in demand it is also strongly recommended that the Centre be active in five major areas instead of the three originally suggested in the Working Paper (op. cit., Section 7.0). Furthermore, as a consequence of the range and highly specialized types of services favoured by the officials, the scale of activity recommended is substantially higher than was intimated as the minimum in the Working Paper.

The recommended activities of the Centre are of two types: "Planning and Services" and short-term projects. Planning and services are grouped together while the short-term activities are discussed by type of function. Each grouping of similar activities constitutes what is called here a function. The high priority subjects enumerated both at the preparatory interagency meeting and by government officials may be grouped under five functions. The functions presented in the Working Paper that received limited interest are therefore dropped.

6.2.1 Planning and Services

The activities that the Centre is required to undertake as an integral part of its own development and in response to repetitive requests from Arab States are: programme planning, organization of conferences, research in institution building in the Arab World, preparation of requests for proposals and the nomination of consultants. Services rendered under this title should be performed on short call and their cost covered by the subscription fees of users.

The activities should not consume more than 14% of the total work load of the Centre. However, because of their importance to the development of the Centre and its relationship to the Arab States, the performance of these activities should always be at a very high level of expertise.

6.2.1.1 Programme Planning

In order that the Centre render useful services, it must possess forward policies based on sustained and systematic research. The work undertaken under this title should have a fundamental bearing on the Centre's policies.

6.2.1.2 Research in Institution Building

The Centre should have a permanent research programme to study the problems and conditions of Arab institutions concerned directly or indirectly with technology and the measures that may be taken to enhance their stability, productivity, usefulness and relevance.

6.2.1.3 Nomination of Consultants

The Centre should assist governments in identifying and recruiting suitable consultants. This assistance would call for the establishment of both a significant brain bank on specialized Arab manpower and a routine system of interviewing and evaluation.

6.2.1.4 Preparation of Requests for Proposals

The Centre should assist ministries and institutions to prepare "requests for a proposal" and in providing the particular institutions with a useful document for soliciting contractors to submit proposals.

6.2.1.5 Conferences

The Centre should organize one or more professional conferences annually on specific subjects. The purpose of these conferences would be to bring specialists together, to draw attention to certain important topics and to generate new and critical literature.

6.2.2 Programme and Projects

The activities of the Centre fall in a specific set of areas. However, the precise programme and/or project is expected to vary considerably over the years. Thus, over a three-year period, the projects may be dominated with issues and policies related to civil engineering technologies. This may be followed by emphasis on food industries or transport. The approach to be adopted for each programme to be comprehensive has to be multidisciplinary. The study of organizations has shown that for an institution to be capable of organizing and undertaking such multidisciplinary projects, it must organize its staff and operations around projects and not around departments. An institution undertaking research activity on a certain topic or on a permanent basis finds advantage in organizing its staff and operations on a departmental basis. For this reason, the proposed Centre is to possess very simple and flexible permanet organizational structure and very dynamic and sophisticated capabilities in organizing projects teams.

The bulk of the work of the Centre (86% of its total workload) consists of short-term projects which can be grouped into five major functions covering the services in demand by Arab States. The following represents a brief analysis of these functions.

6.2.2.1 Policy Design

This function calls for specialization in a number of subjects that are directly or indirectly related to public policies and their influence on technology change and transfer. Frequently, the causes influencing the process of technology change may be institutional, political, social or economic. It is recommended that the adequate empirical studies be concentrated on three major areas:

i) The systematic study of contract formulation and negotiations with reference to cost, technology choice, project organization and execution, transfer of associated technology, sub-contracting to national or Arab firms, procurement of services and supplies, patent licensing, restrictive clauses and validity of patents.

ii) The systematic study of technological activities in major sectors of the Arab economies should be undertaken. In these studies, special emphasis should be given to the processes of technology transfer, the role of national institutions, the development of national and regional engineering and contracting capabilities, forward and backward linkages of existing and new economic activity, employment, economic stability and social well being. Under this title, both the transfer and indigenous development of technology shall be studied.

iii) Providing assistance to the national countries in Arab States in the preparation of technology plans as an integral part of their national development plans.

Some technologies such as agriculture, civil engineering, engineering design and contracting, iron and steel, petroleum and petrochemical should be of interest and concern to most Arab States. Here some $30 billion is being spent annually. It is recommended that the regional Centre embark on several (at least three) large-scale projects (10-30 man-years per project) for the study of the status of these technologies in the Arab world and current practices utilized in acquiring, managing and developing them. Such studies should prove to be of almost immediate value to the policy makers and planners.

6.2.2.2 Seminars and Workshops

The increase in the number of expert manpower should contribute to the increase in the absorptive capacity for technology; it should increase planning abilities and should render Arab States more self-reliant in decision making. One of the missions of the regional Centre is the diffusion and transfer of its expertise to Arab States through seminars, etc. This function calls for the planning and holding of specialized short and long-term programmes for these purposes. Because of the limited financial resources of the regional Centre and the vital role that should be played by the national centres, all seminars and workshops will be planned for senior officials as well as for planners of training programmes. The Centre should hold seminars and workshops only on topics it has projects in. However, the regional Centre may assist national or sister regional institutions to plan and hold such activities. This function is of crucial importance because it assists the individual states to become self-reliant.

The Centre should include a wide variety of services under this title, such as ministries and institutions in Arab States to organize and hold their own seminars, workshops and training programmes. The programmes organized at the Centre should be non-degree activities expressly organized as workshops and seminars for responsible officials engaged in a particular function. These activities should not be aimed at newcomers to a discipline and should not be introductory in nature; rather they should be designed and focused on specific issues of direct concern to the participants. These programmes should be frequent and should focus on critical problems and issues. For example, the area of institution building could be the subject of numerous seminars and workshops a year. This series could, for example, be focused as follows on specialized and vital institutions or functions:

1. Ministries of planning and the planning function,
2. Labour ministries and organizations in relation to technology change and transfer,
3. Directors of vocational and technical schools,
4. Contract negotiation in the civil engineering field,
5. Project planning in the petrochemical field and technology transfer,
6. Project management in the textile industry field and technology transfer,

7. Procurement problems in the execution of construction contracts,
8. Transport problems in the execution of land reclamation projects,
9. The cost structure of projects in the civil engineering field,
10. Current ministerial procedures for project planning, and so on.

The seminars and workshops may be regional or specially designed for one particular country. The training requirements of the Arab States vary considerably and it thus is essential that the Centre approach this problem imaginatively and be prepared to adapt its services to each specific circumstance. They may be specially designed for a particular ministry planning to embark on a new project and wishing to simulate a future situation. What should be insisted upon is that the Centre should not offer courses and training that may be offered by universities or university faculties, but that each programme be designed and conceived for a highly specialized group of officials concerned with a complex and difficult problem.

The Centre should examine the existing institutional facilities for supplying other types of training; it may have to organize seminars and workshops for university and ministry of education officials to discuss these needs and opportunities. The Centre should also consider the preparation of a special series of monographs for the express use of university students and self-taught individuals.

The scope of activities under this title is enormous. Yet it is vital that the planning of this function by the Centre be as much as possible related to and based on the on-going activities in the other functions.

The Centre's information and publication services and policies should play a supportive role in this function. The participants should acquire the capacity for utilizing the information resources and services of the Centre. Thus the participant-Centre association should not be a short, fleeting one but rather a beginning for a long relationship through which the participant may continue to benefit from the information services of the Centre.

6.2.2.3 Assisted Information Transfer

Careful analysis of the expressed needs of the Arab States for information has shown that a variety of services are needed. For the Centre to respond to the needs of the area it must be equipped to go far beyond the provision of simple well defined "facts" and should develop an expertise in supplying a much wider, and less objective, category of information.

The simplest type of information is one where the Centre has to respond to a request for either a copy of a specific report or a published article. Next in complexity is the case when it is asked to prepare a bibliography on, say, the scientific literature on the production of single cell yeast from petroleum. A task of equal complexity is when it is requested to determine the period of validity of a patent or a list of all patents on a specific refining process or on the synthesis of some product. Information and brief reports called for at the conceptualization phase of a project may also be classified in this category.

More complex information requests consist of, say, the comparative analysis of the unit cost of production of polyethylene by the different known processes; or an assessment of research on the preparation of methanol during the past five years and the expectation of a breakthrough in the current methods for its synthesis. Which company is utilizing which patent? Why? Since When? This latter type of question is basically a request for information plus evaluation; the response to such questions will require the time of senior staff. What adds to the difficulty is that the appropriate answer to such questions often depends on a number of contingencies. These and other types of complex information may often best be provided by assisting the interested party to use the Centre's resources and its access to international information systems.

It is recommended that the policy of the Centre on this topic remain very flexible. Governments that lack the staff to carry out such studies may have to be assisted fully by the Centre. In such a case, the information transfer will be equivalent to a pre-feasibility study. Whenever possible, the regional Centre should endeavour to direct technical requests to national or specialized regional institutions.

For the provision of this category of "international" information services, the Centre must develop an effective library collection, a systematic capacit to gain access to all the relevant available data banks in the world with which it should be linked, and to possess a knowledgeable and learned library staff.

But this is not the only type of information that is being called for. Information for negotiating contracts may entail data on different countries and contracts. For example, the background information required for negotiating a $16 billion contract (e.g. the gas collection scheme in Saudi Arabia) could involve a considerable volume of information on: the contractors bidding for the scheme, conditions in the steel industry (since the scheme consumes some 20 million tons of steel), cost of comparable schemes, difference in the cost between importing the approximately 2,000 km of (16/18/40 inch diameters) pipes to be used in the scheme as pipes or as ingots to be extruded in a plant that could be constructed for the purpose in Saudi Arabia, Basra or Suez, shipping costs, insurance, etc. The information requirements for effective negotiations are enormous and must be tailored to suit each case. Negotiations for a steel mill in Algeria with German firms will pose completely different information problems from a dam project in Iraq negotiated with the U.S.S.R.

Information of importance to contract negotiations is extremely time-dependent. Changes in the level of unemployment in a particular country may give the Arab negotiator considerable bargaining power, reducing the cost of the project and the terms of finance. Information is not only needed for negotiation but also for execution. It may be found that steel prices in 1979 are expected to be 50% higher than in 1978. If the project is to be executed on a cost plus basis, then the contract should specify some suitable arrangement to make use of such a likely price difference.

To a considerable extent, most of the above-mentioned information is generated in advanced countries and is available. There is a category of information on the Arab world that may not be available publicly or privately. The generation of some of this information can only be the outcome of extensive field work and research, for example, information on: the cost structure of different types of projects executed in the Arab world; and licensing fees being paid by each Arab State. The work under function 1 will contribute to the generation of this category of information. The Centre could also collaborate with national institutions to compile this type of information.

The information the Centre should be able to provide may extend beyond the strictly technological dimension. The financial state of the contractor, the value of his stocks, currency fluctuation, the state of the economy of his country and his government policies and the export trade all have direct and immediate relevance to negotiations.

It is recommended that the Centre be fully equipped and staffed to provide very complex and sophisticated information. This information may be provided to users for a certain fee.

The Centre should also undertake field studies of the production, dissemination, transmission and use of knowledge in the region with a view to assisting the institutions with the development of their information resources. A detailed survey of existing information facilities in the Arab world and mode of co-operating the projected services of these facilities, should be a prior task to be undertaken by the Centre.

It is clearly not recommended that the Centre become a documentation centre or a data bank. The objective of the above discussion is to emphasize the profound integration between staff and information. The aim of the Centre should be to provide digested and assisted information.

6.2.2.4 Co-operation, Co-ordination and Integration

These three functions are overlapping and are best treated together. It is important to discuss briefly what is to be co-ordinated and integrated, for what reason, and by what mechanisms. The most obvious type of institutions that may be involved here are R&D and consulting institutions that already possess certain expertise and traditions. Here the Centre should contribute in a number of different ways to the diffusion of accurate information on each institution and participate in joint activities. Whenever the need or opportunity arises, the Centre should utilize the capabilities of existing institutions for undertaking specific tasks. Since there are some 300-500 research centres of various sizes and levels of competence in the Arab world, this effort towards co-operation and avoidance of duplication will require substantial manpower.

The regional Centre will depend to a considerable extent on these national and regional institutions for expertise in technical matters.

However, technology is practiced and utilized in a much larger number of firms and institutions than is circumscribed by R&D centres. It is the iron and steel firms, the fertilizer plants, the large and small industries that are directly involved in programmes of technology transfer, procurement and sub-contracting. Some major national firms (public or private) do not have adequate knowledge about the new projects that are relevant to their production or development plans. Furthermore, even within the same ministry one finds projects conceived in isolation from each other. Few of the attempts at integration of projects within the framework of the development plans have attained their objectives.

Naturally, if co-operation, co-ordination and integration of projects on a national level meet with difficulties the equivalent activities on a regional level are virtually non-existent. Furthermore, mechanisms for mobilizing and integrating Arab capabilities in consulting, contracting, manufacturing, etc., are still weak and require considerable development.

The mechanisms for effecting such co-operation and integration are reasonably well-known. For one thing very little may be achieved without accurate and timely information. Such literature should be produced by ACSAD, IDCAS, The Arab Union of Engineers, and various other national institutions. But the Centre should play an important role in identifying the type of information and communication channels that are lacking and endeavour to support and promote effort for overcoming these shortages.

The Centre's contribution to the integration of efforts in technology can best be seen in three domains:

1. The promotion and integration of national and regional institutions performing complementary roles in the technology tool and products cycle (Figure 1, Working Paper, op. cit.);
2. The promotion of the engineering industries and, through them, the Arab capacity for engineering design and sub-contracting;
3. The promotion of Arab capacity for sub-contracting.

Thus under this title the Centre is expected not merely to avoid duplicating the programmes of R&D centres but rather to provide vital and strategic services in sufficient depth and intensity to create solid bonds between other institutions and projects.

A topic that may be treated here and under function 1 is the integration of science and technology with development planning. This, of course, is a problem of long standing and is receiving attention from various directions, including UNCSTD 1979. Under this title, the subject should be viewed as a problem of integrating different government institutions. A careful analytical study of the evolution and status of the mechanics and nature of the planning exercise in a number of Arab States should provide useful materials for government action.

Thus the Centre may:

1. undertake periodical surveys of R&D institutions, and diffuse information in standard and easy-to-use formats;
2. analyze development plans and projects in terms of their technological components and assist governments, manufacturers, and institutions in identifying Arab sources of technology for undertaking the execution of projects;
3. identify areas of technology which require rapid development to meet planned needs;
4. propose national and regional legislation designed to introduce and to enforce standards and quality controls to facilitate the integration of national production of materials, supplies and equipment via sub-contracts with foreign engineering firms for installations in the Arab world;
5. serve as an informational clearing house for governments, contractors, labour organizations and professional organizations;
6. prepare annual directories on Arab engineering, contracting and manufacturing firms with a view to improving communication between them and other economic activities;
7. compile information on all projects in the Arab world from the conception and technical feasibility study phases to the termination phase, this information to be codified and made routinely available to assist Arab engineering, manufacturing and contracting institutions to plan, adapt and seek to participate in those endeavours in which they are qualified.

6.2.2.5 Development of Appropriate Technology

The Centre shall engage itself in the study of technologies that are or may be relevant to the Arab States. The Centre shall study, evaluate, assess specific technologies whether in use in the Arab world or not and would develop methodologies for the assessment of appropriateness.

There already exists a large variety of technologies in the region; many of these have originated in the area while other are of more recent acquisition. Yet the geographical diffusion of these technologies within the same country or throughout the region is slow.

The emphasis of this function should be on the technology rather than the policy aspect of programmes. Nevertheless, the interaction between technology and policy must not be avoided. Activities under this title will provide the Centre with numerous opportunities for co-operative work with Arab R&D institutions. Detailed technological studies on water use, agricultural methods, construction, etc. will depend on close collaboration with national institutes and centres and agencies of the United Nations.

The Centre should also undertake systematic and organized field and literature surveys of technological activities in other developing regions of the world as well as in advanced countries in order to be appraised of on-going developments. This may be accomplished by the utilization of published literature, frequent trips to other countries by senior staff and possibly the establishment of permanent offices in regions of the world generating useful technologies of relevance to the region.

6.3 Level of Activity and Scheduling

The size of the Centre in terms of staff and budget is a variable that is dependent on a number of considerations. Some of the most essential shall be enumerated and discussed. We shall be concerned here purely with the staff required during the first three years and which may have to be supported from the Centre's financial resources. The proposed staff will be utilized on unsolicited research programmes expressly planned by the Centre to develop the basic tools and data base for effective and large scale contributions to the Arab States. It is this type of programme that would impart to the Centre its uniqueness and usefulness.

Two levels of activities for the proposed Centre will be presented. Level A denotes the minimal size that would still enable the Centre to offer some services in the requested five functions where the scope of work will be limited and the services offered may not cover all the Arab States. In level B the Centre shall be able to provide services that could reach every Arab State. Letters A and B after a number shall denote that the numbers presented refer to levels A and B respectively.

The level of activity shall be presented in terms of senior manpower at the Centre for three periods:

First period: preceding the appointment of the first director;
Second period: the first year after a director is appointed;
Third period: the second year after a director is appointed.

It is recommended that during the first period the first and only professional appointment be that of the director. By the end of the second period work in progress should have grown to require 60(A)/125(B) senior staff and consultants. It is recommended that during this period the ratio of staff to consultants be 1:2 and that the average overall level of effort for the year be close to 16(A)/40(B) man-years.

By the end of the third period it is reasonable to expect that work in progress should have grown to 100(A)/250(B) senior staff and consultants, the ratio of senior staff to consultant increased to 1:1 and the overall level of effort for the year to be 64(A)/160(B) man-years.

During the succeeding three years the Centre should aim to stabilise staff, decrease the use of consultants to 40% and become self-financing from the services it renders by the fourth and, at the latest, the fifth year. Furthermore, during this period size will be determined by the capacity of the institution to manage projects as well as by the requests for the Centre's services.

In 6.2 sufficient information was presented on the basic functions and work to be performed by the staff of the Centre to enable us to estimate the level of effort needed.

It is recommended that Planning and Services be budgeted with 14(A)/20(B) senior staff [14(A)/8(B)% of the Centre's staff]. Only 3(A)/6(B) out of the 14(A)/20(B) are for strictly internal work (activity 6.2.1.1).

The remaining senior staff are all committed to providing services to Arab States. With the same 3(A)/5(B) senior staff it should be possible to cover one to two categories of institutions each year (activity 6.2.1.2). With 2(A)/3(B) staff members it should be possible to organize and publish the proceedings of 3 to 9 major technical conferences each year (activity 6.2.1.5), with four staff members it should be possible to prepare about 100 RFPs per year (activity 6.2.1.4). This would constitute some 4% of all contracts signed annually with international firms. Nomination of consultants should not require more than two staff (activity 6.2.1.3). The only activity here that may turn out to be underestimated is the programme planning. The Centre's programme design and planning shall be a particularly complex matter for several reasons: the use of programme budgeting; total commitment of staff to projects rather than to departments; and the impact of the external policies of the institution concerning co-operation and co-ordination on the design of projects. This figure of 3(A)/6(B) may have to be increased (See tables 3 and 4).

The bulk of the staff and consultants are to be committed to projects falling under the five functions 6.2.2.1 to 6.2.2.5.

Projects and programmes vary in scope. Two basic principles have been utilized in estimating the scope:

1. that the studies should be sufficiently detailed and comprehensive to constitute a definitive contribution and a basis for decision making.
2. that the services are sufficiently extensive to make substantive contribution to the 21 Arab States and to regional Arab organizations.

The patterns utilized, the number and scope of projects and the frequency of the services are summarized in table 3. At this time, it is not possible to state the range of these parameters and services more precisely. The precise numbers have to be determined for each individual case at a later time.

The management of the Centre and the projects will require an additional 5(A)/10(B) senior staff. With a total of 96(A)/230(B) staff members an additional 4(A)/10(B) men will be needed for contingencies. Thus the total is 100(A)/250(B). Table 4 summarizes this information.

Table 3

		Level of Effort per unit of activity	Recommended Number of activities/year.	
			Level A	Level B
6.2.1.1	Programme Planning	About 5% of manpower committed to projects	3	6
6.2.1.2	Research in Institution Building	2 to 3 man-years per study	1 to 2	1 to 2
6.2.1.3	Nomination of Consultants	-	200	200
6.2.1.4	Preparations of RFPs	1 to 2 weeks per RFP	100	100
6.2.1.5	Conferences	6 man-months per conference	4	6
6.2.2.1	Policy Design	1 to 4 man-years for medium-scale projects 8 man-year per major project	2 to 3 medium-scale and 2 to 3 major projects	4 to 6 medium-scale and 4 to 7 major projects
6.2.2.2	Seminars and Workshops	6 to 12 man-months to prepare and hold a seminar or workshop	8 one-week seminars 3 two-week workshops 10 one-month workshops	25 one-week seminars 10 two-week workshops 30 one-month workshops
6.2.2.3	Assisted Information Transfer	4 weeks per enquiry 1 to 3 man-years for a study 2 to 5 man-years to develop data bank.	200 1 to 2 studies data bank	600 3 to 10 studies data bank
6.2.2.4	Co-operation, Co-ordination and Integration	Projects data collection and analysis: 5 man-years; Institutional data and studies: 10 man-years; Implementation of programmes of co-ordination, etc: 15 man-years	Programmes involving 250 to 500 institutions	Programmes involving 500 to 1000 institutions
6.2.2.5	Development of Appropriate Technology	50 to 300 man-months per project: average 100 mm/project	1 to 2 projects	3 to 6 projects

Table 4

Recommended Level of Effort

		Senior Staff	
	Planning and Services	Level A	Level B
6.2.1.1	Programming Planning	3	6
6.2.1.2	Research in Institution Building	3	5
6.2.1.3	Nomination of Consultants	2	2
6.2.1.4	Preparations of RFPs	4	4
6.2.1.5	Conferences	2	3
	Programmes and Projects		
6.2.2.1	Policy Design	25	60
6.2.2.2	Seminars and Workshops	17	50
6.2.2.3	Assisted Information Transfer	10	30
6.2.2.4	Co-operation, Co-ordination and Integration	15	30
6.2.2.5	Development of Appropriate Technology	10	30
Contre and Projects Management		5	10
Contingency		4	20
GRAND TOTAL		100	250

A few additional explanations may be made here to clarify the figures presented in tables 3 and 4. In table 3, it is stated that the level of effort per study on institution-building (6.2.1.2) is in the range of 2 to 3 man-years per study. Under levels A and B, the number of recommended activities per year is 1 to 2. Therefore, the manpower needed is 1 x 2 to 3 x 2, or 2 to 6 senior man-years per year. The figures 3 and 5 are entered for 6.2.1.2 in table 4 as these fall between 2 and 6. In other words, if level A is selected, one may expect the Centre to complete roughly one major project in this field per year while if level B is selected one should expect the completion of two such major projects. In task 6.2.2.4 discussed earlier in detail, a number of possible activities have been identified. This function of the Centre has been repeatedly stressed by all concerned parties. To perform it, the Centre must compile and publish promptly a large range of different types of data on projects and institutions. It is estimated that a staff of five senior men are needed to perform these tasks. Another function under 6.2.2.4 is one of analysis of development plans and of projects. Since there are (at most) some 21 development plans and an enormous number of projects, it is estimated that at least 10 senior men must be continually employed in the execution of this activity. But once all of the data and analysis has been compiled and is available, the Centre has to identify and study the options that present themselves for the integration of the capabilities of national and regional institutions, for the promotion of Arab capacity in contracting and sub-contracting in the engineering and procurement fields. For this demanding task, 15 senior men are allocated. The total comes up to 30 senior men. This is now entered under level B. In order to reduce this level, it was assumed that two things may be done:

1. reduce the scope of the data collection and analysis of projects and development plans by 50%.

2. reduce the efforts to be provided by the Centre for integrating the vast array of firms, ministries, institutions also by 50%.

Thus the manpower for level A is reduced to 15. Under level B, adequate coverage of all the Arab States is expected while under level A roughly 50% coverage may be attainable.

It is of course possible in principle to have fewer workshops and seminars, few policy studies, and to reduce considerably the proposed programmes both in scope and depth. The central conclusion from the extensive consultations conducted is that the Arab States feel the need for high quality service in a large number of fields and are not interested in either limited or poor quality service. The unfortunate criticism directed at some existing institutions should serve as a warning against too limited a programme.

6.4 Governance

Governance consists of the authority and responsibility invested in an exogenous body for the management of an institution. Such a body would not be part of the internal organizational structure of the Centre but would have the authority and responsibility for determining its policies, within a prescribed enabling constitution, in monitoring and evaluating its functioning; in legitimizing its public existence; and in ascertaining and approving its financial operations. This responsibility includes the adoption of sound financial policies, and intervening on behalf of the institution with the appropriate authorities to support the institution's activities. The quality and performance of an institution are a direct reflection of the quality, seriousness and capabilities of its governing body.

The governing body of a new institution of the type under consideration:

1. must necessarily possess competence in the affairs of the institution. For the proposed Centre, this includes competence in economics, social, legal, technological, managerial, financial and Arab political affairs and problems.

2. must be able to devote considerable time to the study of its problems and to attend a minimum of two annual meetings.

3. must be committed to the concept of the Centre and be prepared to devote their energy to the success of the project.

The system of governance should permit a satisfactory representation of all Arab States and of relevant regional institutions and at the same time provide a compact and effective system of management. This system is one consisting of a Board of Governors and a Board of Directors. The Board of Governors may consist of one representative from each Arab State, one from each regional institution (e.g. OAPEC, the five Arab funds, agencies of the Arab League such as

IDCAS, ACSAD, the Federation of Arab Scientific Research Councils, ALECSO, CAEU) and ECWA. The Arab States may however decide to limit the governance of the Centre to its Arab member countries and give Arab funds and regional organizations a secondary role. In any event, since most if not all of the Arab organizations are directly or indirectly under the control of the Arab States, the governance of the Centre will fall under their control through their representatives on the Board of Governors. The inclusion of representatives of some Arab organizations and ECWA on the Board of Governors would have the merit of facilitating the co-ordination of the Centre's activities with those of the Arab organizations and ECWA without diminishing the control of the Arab countries over the policy and operations of the Centre. The national representatives will be appointed by each government for a period of three years and will elect from its members a Board of Directors.

The number of persons serving on the Board of Directors should be sufficiently large to reflect different points of view, yet sufficiently small to permit effective collective behaviour. A Board of Directors composed of 9 to 14 members seems reasonable.

The advantage of such a system is that it affords an opportunity for all relevant institutions and governments to be represented in the management of the institution. The large size of the Board of Governors disables it from effective participation in the affairs of the institution. This is compensated for by a smaller Board of Directors.

Irrespective of the type selected, there must be continuity in the membership of both the Board of Governors and the Board of Directors. Though all members should eventually be appointed for a period of three years, there should be a systematic process of replacement during the first three years. For example, one third of the initial membership is appointed for three years, one third for two years and one third for one year. All replacements should be appointed for three years. Reappointment should be possible. The Director of the Centre should be an ex-officio member of the Board.

Members of the Board of Governors and the Board of Directors should be appointed on their own merit and for a fixed period. They should not be temporary delegates by virtue of a position they hold. This is a necessary qualification to achieve continuity.

One of the basic duties and responsibilities of the Board of Directors should be the appointment and termination of the Director of the institution. To safeguard the interests of the institution this appointment should be undertaken after careful deliberation and investigation. The Director is the exclusive representative of the governing body within the institution. Sound management practices require that no member of the Board of Directors should intervene in the internal affairs of the institution. Proper procedures should be adopted in the event of a difference of opinion between the governing body and the Director.

One of the most common causes for institutional breakdown arises from conflict between a Board of Directors and the Director of the Institution. Guidelines for these procedures are discussed in Section 6.5. Thus, the Board of Directors should determine its procedures and policies before appointing the first Director. Although the Board of Directors of any institution is by definition the source of its ultimate authority, it is the Director who should be the sole instrument of the Board for the execution of its institutional programmes. It is of the utmost importance to prepare and publish documents specifying the responsibility, authority and criteria for evaluation of the Director before his selection and appointment. Similarly, the Board should adopt by-laws defining its authority and responsibility in every field of activity. The touchstone for sound institutional health is the unity between the Board and its appointed Director. This relationship should be explicit to guarantee that it remains friendly and co-operative. It is equally important to observe that the Board of Directors should not abdicate its responsibilities in the hope that the Director will fill them. It is crucial that both the Board and the Director fulfil their responsibilities integrally. The Board is the only authority that is responsible for a final assessment of the past performance of the institution and in modifying its policies accordingly. The Director will be too involved with the process to be able to take his distance and correct readily his course. This function of the Board should not be directed against the Director, but rather it should be supportive of his efforts. Another vital responsibility the Board must fulfil is the audit of both the programmes and accounts. The burden for fund raising for expansion and development must rest heavily on the Board.

But all of these are secondary roles of the Board of Directors. Its fundamental purpose is to reflect, interpret and formulate social and economic demands of Arab society in terms of programmes and policies and to see that the Centre possesses the instrumentalities to implement its decisions. Unfortunately, boards are often thought of in terms of their "negative" aspects - as controllers and auditors - rather than as the authority responsible for directing the affairs of an institution and in providing it with the means to attain its objectives. A deep sense of responsibility and commitment amongst the Board members is required for an institution to succeed.

All high ranking senior staff may be appointed by the Board upon nomination by the Director. In all cases, these appointments should be carefully reviewed. The Director may not terminate high ranking senior staff: he may recommend their termination to the Board.

Meetings should follow Roberts Rule and all decisions must be taken by a majority vote.

6.5 Organization and Structure

6.5.1 Basic Rules and Conditions

The Director of the Centre has to possess full authority to execute the programme approved by the Governing Body within the:

1. Approved administrative procedures;
2. Approved personnel procedures and salary scale;
3. Approved budget and work programme.

All rules and regulations and salary scale should be expressly designed in the light of a realistic appraisal of the manpower market conditions and the location of the institution.

The Centre should develop a sound policy on staff career structure to be able to retain the services of competent staff. The Centre should develop a programme for the attraction, development and retention of capable young professionals. Thus the Centre's career structure should clearly exhibit the process from initial appointment to the various steps in the ladder of promotion and the criteria to be met to move from one level to the next. It is strongly recommended that this process exclude degrees and tenure of post as basic criteria and depend nearly exclusively on performance as expressed in publications and reports (published or unpublished) but all must be available to the evaluation committee. (See later). Standards and procedures for staff assessment and evaluation must be realistic, known to all applicants before appointment and carefully and fairly implemented. Research, consulting, training and education are activities that may appear difficult to evaluate, yet persons experienced in the field will find little difficulty in judging performance if all the output of each individual is adequately recorded. Thus the management system of the Centre should be no different from that of sound business consulting firms where such records are routinely kept.

Explicit, rational, efficient, conductive and supportive management procedures are absolutely necessary for the proposed Centre. The considerable difficulty of the Arab environment, the enormous pressures that will be placed on the Director and his senior staff to "prove themselves" and "to deliver services", the modest budget that will most probably be allocated, should stimulate the Centre and its Board of Directors to refuse shortcuts or savings when it comes to the procedures for the management of the Centre.

This emphasis on sound management practices should in no way result in a bureaucratic institution: the Centre should be operated as a high power think-tank/consulting firm; the recommended management procedures should be a tool to achieve such a purpose.

6.5.2. Structure of the Institution

In order that the Centre be able to undertake the type of proposed functions it must possess an adequate form of organization. It must possess capabilities for:

1. Planning: to design and plan future programmes;
2. Programme management: to supervise, review, evaluate current activity, whether in training, research or conferences;
3. Finance and Administration: of legal, finance, support facilities, staff communication;

4. *Effective Centre-User relations*: between Arab world and Centre. This is not a public relations function, but a *systematic planned* professional relationship between the Centre and counterparts as part of the Centre's programmed services to communicate its findings, identify problems, discuss new projects and keep the users of the Centre personally abreast of its activities;

5. *Programme support facilities*: library, computer, data banks;

6. *Projects*: the staff and services that will be necessary to conduct the programmed projects,typing, printing cost, translation.

The identification of these activities is necessary at this stage because they do have cost, management, and organizational implications. One of the common weaknesses of Arab institutions is the weakness of the planning and management functions. Normally, these are assumed to require very little time and to fall within the purview of the Director. Although no doubt the Director should be ultimately responsible for the planning and review of the institution's output, the quality and level of this planning and supervision are normally extremely limited.

The planning and programme management functions are essential activities in the identification and pursuit of institutional objectives as well as in the control of the quality of the Centre's output and the institutional management of projects. It is through such functions that a project experience is internalized and institutionalized. Methodologies and models are revised, discarded, modified. These functions permit the institution to digest and learn from its activities. All too often, one finds institutions that employ a consultant for a job. Once the consultant's report is presented he no longer belongs to the staff. The report is shelved and presented to a beneficiary. However, the institution has not absorbed the consultant's findings. An institution such as the proposed Centre will depend on consultants for a considerable volume of its work. For this reason the functions indicated are vital to its growth and reputation. As far as the beneficiary is concerned, it is the Centre that is responsible for the report and not the consultant. The consultant is merely responsible to the Centre. For the Centre to render credible services it must have the procedure and qualified staff to evaluate and edit every report and every publication it issues.

The design and selection of projects should also be primarily an institutional matter within the framework of an institutional programme and policies. All too often in Arab institutions, it is the consultant who proposes and/or designs new projects; the entire life-cycle of a project is thus external to the institution.

This document dwells at length on these points because they are often neglected; and this neglect contributes to the observed weaknesses of Arab national and regional institutions.

It is recommended that the Centre have no divisions or departments and that all staff be freely transferrable from project to project - naturally depending on qualifications and abilities - and from function to function. Thus it is recommended that there be only ranks, e.g. "Senior Analyst", "Associate Researcher", "Research Assistant". It is recommended that the management positions consist of: Director; Chief of Projects Division; Chief of Administration and Finance Officer; Administrative Officer; Manager of Computer Centre; Information Officer.

The Director should serve as the direct manager of the Planning and Programme Management Unit. The Computer Centre Manager and Information Officer should report to Chief of Projects Division, the two Chiefs to report to the Director.

In this arrangement the Director is to fulfil four central institutional functions: Planning; Communication with Governing Board; Programme Management; and Overall supervision of finance and administration.

The full weight of project management should be placed on the Chief of Projects Division. This provides the institution with the requisite process to separate the execution of a project from its review and assessment.

From the summary of the proposed programmes presented in tables 3 and 4, one notes that the Centre is expected to undertake five different classes of activities with roughly the following intensities:

Projects: The total number of projects is in the range of 10(A)/30(B). It is proposed that all of these be managed by the Chief of Projects Division.

Information and Data Banks: The organization and compilation of data to be managed by the Information Officer.

Conferences, Seminars and Workshops: There will be between 25(A)/70(B) different activities of this type per year. Each one of these should be planned and executed by a senior person appointed by the Director for that particular task. The Administrative Officer should be responsible for transport, housing and related functions normally associated with such activities.

RFPs, Consultants, Information Services: Between 500(A)/1000(B) small actions are to be performed annually under tasks 6.2.1.3, 6.2.1.4 and 6.2.2.3. Here accuracy and speed are of the utmost importance. It is recommended that all three services be managed by a small unit of 1(A)/2(B) persons in the Director's office that utilizes the resources of manpower and data of the Centre.

Functions associated with 6.2.2.4: Co-operation, etc. The activity under this function is complex and some of it falls under data collection (to be managed by the Information Officer), some under projects and some consists of very specialized publications and services. Although for administrative purposes it may be possible to break these activities under the above-mentioned classes, it is felt that such a breakdown may weaken considerably the potential contributions that this function is designed to render. On the other hand, it should be a policy of the Centre that no specific activity becomes a routine and permanent function. For example, the services rendered to the Arab ministries, engineering and consulting firms as well as development funds may conceivably, once fully routinized and the procedures established, attract the interest of existing Arab professional associations and/or other regional institutions. It should be the policy of the Centre to actively promote the transfer of such programmes to other interested parties in a way that guarantees their satisfactory functioning and thence move on to other priority areas that have not attracted adequate attention. For this reason, it is recommended that function 6.2.2.4 be managed as a project by a project manager reporting to the Director of the Centre rather than the Chief of Project Division.

The proposed management roles places heavy responsibilities on a small number of key individuals. These, of course, are expected to have adequate assistance: 5(A)/10(B) and the entries under contingency 4(A)/20(B) are specifically included to provide manpower to unblock bottlenecks as these arise. Naturally, the Director has to keep management under continuous review and when changes are indicated, these should be proposed to the Board of Directors, discussed, approved and implemented. The proposed management has been inspired by the need to maintain strong central planning and control in all multidisciplinary work. Otherwise, activity would decompose into a set of specialized projects along departmental lines.

The relationship between the Centre and the users should not be based on a "public relations" basis, but rather as an integral part of the Centre's programme. All staff should be involved in such a programme.

6.5.3. Mode of Operation

It is recommended that the Centre adopt programme budgeting in order to facilitate internal supervision and fruitful involvement. The methodologies of planned programme budgeting will permit the Board of Directors and the Director to discuss fully and meaningfully the Centre's planned activities. The approval of the programme can then be transmitted directly to the projects' departments. The Chief for Finance and Administration can then perform his duties within the same framework.

In an institution of the type proposed there are two transactions that are crucial to the Centre:

1. The negotiation and development of a project with a beneficiary;
2. The completion and submission of the project reports to the beneficiary.

Both of these transactions must pass through the Director. The Planning and initiation of any project and the documents to be submitted upon termination should receive the Director's explicit approval.

No staff member should be able to commit the Centre to any project or submit any formal report without prior clearance. Naturally, the project manager submits his reports to the Chief of the Projects Division, and it is the latter who submits the final reports to the Director. It is one of the chief duties of the Director to see to it that every document is expertly reviewed and evaluated. Reports should not be submitted before the indicated changes are carried out.

A project should recieve periodic review in formal sessions by a committee constituted by the Director. The frequency of the review depends on the complexity of the project, its duration and its nature. The purpose of these reviews is not only to ascertain that programmes are on schedule but to assist the project manager in the development of methodology, to transfer methodologies developed by a project manager to other programmes and so on. Hence these reviews have a routine, a learning and an institutional function.

6.5.4. Project design and integrative role

The Centre will be able to contribute in a number of different fashions towards this goal. Whenever possible, (and as long as this does not prejudice the project or the development of the Centre) it should be the Centre's policy to:

1. Sub-contract portions of a project to national and regional centres;
2. Utilize existing faculty resources of some of the Arab universities; although opinions differ on the involvement of professors of Arab universities in some aspects of the Centre's work, nevertheless, it is believed that the interaction between the Centre and the universities would result in beneficial effects to both types of institutions. On the one hand, the Centre could make use of the faculty members of Arab universities in highly specialized areas for a short period of time without adversely affecting their teaching responsibilities and quality. On the other hand this arrangement would expose faculty members of universities to specific problems of the region and involve them in problem solving activities.
3. Participate in joint ventures.

It is advisable that, although the Centre should be in principle agreeable to such relationships, each new arrangement be carefully planned and the roles and responsibilities explicitly specified. It is far better not to enter in an agreement that has a possibility of contributing to inter-institutional tensions or beneficiary dissatisfaction. Until the Centre has acquired sufficient experience in the design and execution of such forms of co-operation, emergency plans should always be built into each such project in case the co-operative arrangement does not succeed. The Centre's policy should be always to meet deadlines and not to accept a project unless it can guarantee its successful termination. Such a policy is not easy to pursue; the policy may be costly; projects such as those which cannot be successfully implemented by the expertise available to the Centre should be avoided.

6.5.5. Staff and Consultants

The mode of operation of the Centre depends strongly on the percentage of the load of its activities carried by short-term consultants. A number of regional organizations depend heavily on consultants for the execution of programmes. It is not possible to build the capacity and facilities of an institution unless a substantial part of the project management and the studies are undertaken by permanent staff. It is difficult to set a precise figure as to what could constitute a dangerously low level of staff participation. It is recommended that this matter be kept under close supervision during the first five years of the Centre's life. During this period effort should be made to execute at least 60% of the projects with permanent staff. It must be remembered that during this period all staff is new and must be integrated into an effective team. Furthermore, there is an unusually high rate of turnover during the first few years in the life of an institution.

During this initial and critical period all staff and consultants should be subjected to brief training programmes in project management in order to standardize the Centre's procedure and develop adequate forms for each particular situation. The experience gained should not only serve to improve the Centre's procedures but should be diffused through specialized training programmes and publications.

6.5.6 Relationships of the Regional Centre with Other Centres

There already exists in the Arab world a large number of functioning national, regional and international institutions. At this time it is useful to establish broad guidelines as to the nature of the relationships the Centre should seek to develop with these institutions.

It is recommended that the Centre be guided by four general principles:

1. To utilize the existing institutions in a manner and to an extent that permits it to ptovide effective services to the Arab States;
2. to endeavour to assist existing national and regional institutions to develop their resources and capabilities;
3. the regional Centre, as well as the national and sister regional institutions, should seek simple and non-bureaucratic relationships. The regional Centre must always conserve its capacity to manage

and deploy its resources to fulfil its mission subject to its statutes and the directives of its Board of Directors. The regional Centre should not enter into any relationship that interferes with its ability to fulfil its mission.

4. To create, if the increasing demands on the Centre's services require, and if the need still exists, specialized regional centres (e.g. centres specialized in petrochemicals, or agriculture, etc.) and link them up to the main regional centre which will then perform the role of a co-ordinating body for these centres.

It is to be expected that the intensity of interaction of the proposed Centre with individual institutions is contingent on the nature of the projects under execution. Thus the Centre may not have much to do at any one time with a large number of these institutions.

6.5.6.1 The Arab States and the Regional Centre

The services of the Centre are generally useful to ministries and large public institutions such as state organizations. Specialized national institutions in engineering, R&D planning and information may also have occasional use for the services of the Centre. Some Arab States have already established committees and/or centres for the transfer and development of technology. Other States presently possess only rudimentary planning and R&D engineering institutions. It is recommended that the relationship between each Arab State and the Centre be designed on the basis of needs, wishes and capabilities. This relationship should be subject to review and evaluation by both parties and at regular intervals. Thus some States may wish to channel all communications between the regional Centre and government institutions through a national institution, others may establish two or more formal channels of communication. The fact that all the Arab States have had formal links with international and regional organizations for a considerable period of time provides each State with an empirical record of the efficiency of such links. It is recommended that these records be carefully evaluated with a view to designing effective channels of communication between the Centre and the individual States.

In the event that a State does not possess a national Centre for the management, transfer and development of technology, suitable direct channels of communication between ministries and the Centre have to be designed. Again these communication channels should be subject to study and review at regular intervals.

The regional Centre on the other hand, will need the services of some national institutions in the execution of regional studies and programmes. It is recommended that the regional Centre be authorized to communicate directly with relevant institutions whenever the regional Centre requires their services for the execution of a project it is initiating. In all these interactions, the elements of speed and efficiency should be of considerable importance. Because the regional Centre will not possess any R&D or engineering capabilities its operations may be severely curtailed unless it can enter into a direct and effective relationship with national institutions. The alternative of utilizing the services of foreign institutions should be utilized only in extremis and not as a routine procedure.

Clearly, effective interdependence between the regional Centre and national institutions must be patiently and carefully developed. Both parties must make positive contributions towards the establishment of these relationships.

Often, the regional Centre may require the assistance, co-operation or participation in its programmes of specialized units in ministries. It is understood that official authorization may be required. However, because the body of technology and experience possessed by some of these institutions is enormous, it is hoped that the Arab States will look with favour on such relationships.

6.5.6.2 The Centre and Other Arab Regional Institutions

A number of regional institutions affiliated with the Arab League, or essentially independent, presently exist. Some such as ALECSO, CAEU, IDCAS, the Federation of Arab Scientific Research Councils, ALO and others may have numerous joint projects with the Centre. It is recommended that the regional Centre evolve its pattern of relationships with sister regional institutions informally during the first two to three years.

Formal relationships embodied in co-ordinating sub-committees and the partitioning of areas of activities should not be considered until after these institutions have worked together for a few years.

The Arab development funds may be treated on two levels: as users of the services of the Centre and as partners in the execution of projects. The Arab funds, like some of the Arab ministries, already possess considerable experience and the regional Centre will need to depend on this expertise in its studies.

6.5.6.3 International Organizations and the Regional Centre

A number of international organizations that operate in and out of the Arab world exists. Many of these organizations have played - and still play - important roles in technological transactions. Thus the regional Centre will naturally have to communicate with them. Institutions such as FAO, UNCTAD, UNIDO, WHO, WIPO and others may at times be partners in the execution of the Centre's projects. It is recommended that the regional Centre develop these relationships informally. It is also recommended that the formal representation of the UN family on the Governing Board of the Centre be limited to ECWA. The relationship of the Centre with all other UN and non-UN international organizations should be based on need and mutual agreement.

6.6 Budget and Finance

The determinants of the budget for the proposed Centre are: the scope, nature and diversity of the Centre. These have been discussed in sections 6.2 and 6.3 in this report.

For the purpose of having highly qualified senior staff in the Centre, the salary scale must be predicated against the international rather than the national rates. "Senior Staff" covers a large category of manpower and a fairly large salary range. For the purpose of this report, a senior man is one who can perform a task independently and satisfactorily. The salary for such senior staff will range between US$ 20,000 and US$ 60,000 a year. This range overlaps with that of the UN scale up to the US$ 50,000 point.

The unit cost per senior staff is a function of: the Middle Eastern and world market demand for specialized manpower, the cost of living in the country where the Centre is located and, of course, the continuing inflation.

For the purpose of this report US$ 35,000 will be assumed to be the average salary. To this must be added the cost of 4 support staff (typists, accountants, research assistants, technicians, etc.) costing an additional US$ 15,000. Thus the direct salary of a senior man and his support becomes US$ 50,000. The overhead (indirect) cost consists of health and life insurance, retirement funds, moving expenses, computer time, cables, mail, travel, telephones, rent, heating and air-conditioning, stationery, etc.; it is a sum equivalent to the direct cost. Thus roughly the unit cost per senior man is US$ 100,000 a year. This may increase to US$ 150,000 or even to US$ 200,000 in some Arab States; in others it may decrease slightly.

According to the above estimation, a minimal size Centre of 100 senior staff (level A) will call for a budget of $ 10 million per year. The annual budget for a 250-senior staff (level B) should be $ 25 million.

At the present rate of inflation in the Arab States allowances must be made for a 10% to 30% annual increase in these figures subject to the location selected. This may have a significant effect on house rents and other expenditure. Thus it is recommended that the Centre provides the staff with easy credit financing to purchase their own apartments or houses. Such a housing programme would not only assist in combatting the high cost of housing in most of the Arab States but also would discourage turnover among staff.

In the original Working Paper it was estimated that a minimum viable size of a Centre would cost some US$ 6 million annually. However, after the detailed analysis of the mission reports, the scope of the services requested, the observed high rate of inflation in most of the Arab States during the past two years, the current level of salaries for this category of manpower, the estimates have had to be revised upward.

For the proper functioning of an institution most plans and staff commitments must be made one to two years in advance. This is impossible without a definite and regular income. For a new institution that is attempting to attract capable individuals away from their present occupations, it is essential that the resources to finance its programmes for a period of five years be available. Naturally, these resources are under the control of the Board of Governors and are invested to generate income. One of the common causes for institutional difficulties in the Arab world is their financial insecurity. Given financial security the institution should be able to plan and execute its programmes with confidence.

6.6.1 Categories of Finance

The Centre faces two different financing problems. The first is associated with the founding of the institution and the second with its sustenance after it has been founded. It is recommended that the Centre's financial policies be relatively conservative. The Centre should establish:

1. An operating budget: The operating budget should be based on a large variety of sources and not on any one large contribution.

2. A Trust Fund: Substantial non-recurring donations should be deposited in a Trust Fund. The Centre should build up the Trust Fund to a level that normal income from these investments can meet all the permanent commitments of the Centre. This may be a figure of the order of 30% to 50% of the operating budget.

3. A Capital Fund: Initially, it may be desireable for the Centre to utilize prefabricated and/or rented temporary facilities. But once the Centre's operations become stable and an agreeable location is found, it may be useful to consider permanent structures. For this a substantial investment may be needed. Other capital investment must be made in the library and computer facilities of the Centre. It is recommended that all capital investments be associated with deposits in the Trust Fund. A wise financial policy requires that these deposits be equal to ten times the expected annual operating cost of the new facilities. A common problem of institutions is the under-estimation of the financial obligations incurred by new facilities.

6.6.2. Sources of Finance

The Centre should seek to diversify the sources of its income. The following sources should be vigorously tapped:

1. Fees from States and institutions that are chartered members: An annual fee should be paid by all States or institutions that accept to be chartered members of the Centre. All Arab States, the regional development funds, and the Arab League are potential contributors. This income should be committed towards the operating budget.

   These fees will cover the cost of services the institution would render on a routine basis to users under Planning and Services. The annual membership fee may be the same for all members and set at $ 100,000; it could also be on the Arab League scale utilized for computing national commitments. Special considerations may be given to States that may be unable to cover their fees.

2. Income from services rendered: the Centre should be authorized to be paid for projects it undertakes. General consultancy contracts with specific ministries may be a mechanism for rendering services and generating income during the first few years. Income from this source

should become significant in the third year and by the fifth year it may account for possibly 80% to 90% of the operating budget.

3. Grants and donations from national governments and regional institutions: At the time of founding, a minimum of US$ 50(A)/125(B) million should be sought to provide the income to cover the operating funds and the beginning of a Trust Fund for the first five years.

6.6.3 Minimal financing

Elsewhere in this report it was observed that present and future development projects in the Arab world involve considerable expenditures. The cost of feasibility and engineering studies in executing these projects and the licensing fees paid may amount to the neighborhood of US$ 6 billion annually. The cost of the proposed Centre which is expected to cope with problems associated with the technological activities related to these projects form only an infinitesimal portion of this amount. It is most likely that the Centre could contribute knowledge and services that will enable the Arab States not only to economize on these expenditures but, equally important, also to effect a more systematic and balanced programme of technology change. The latter will have a major impact on employment, the development of national institutions, self-reliance, and industrialization.

Given this background the proposed budget is not excessive. However, it is possible that the cost, value and importance of high quality services the Centre is expected to provide may not be appreciated. If it is not possible to raise the funds and to provide the necessary financial security it is recommended that the Centre should not be established immediately. Instead other alternatives may be suggested: (1) expanding the existing institutions and adapting them to provide some of the proposed services; (2) prolonging the preparatory period until the necessary funds are secured.

It would be most desirable if at the time of founding, the sum of US$ 50(A)/125(B) million is raised. The estimated expenditure and revenue during the first five years are shown in Table 5.

Table 5

	Expenditure US$ million		Income Generated US$ million	
	A	B	A	B
Pre-founding period	0.5	0.5	0	0
First year*	3	7	0	0
Second year	3	16	2	5
Third year	10	25	4	15
Fourth year	10	25	8	22
Fifth year	10	25	10	25
Total	36.5	98.5	24	67

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* US$ 1(A)/3(B) million are budgeted in first year for the library.

A large number of suggestions to reduce the initial funding may be thought of. The most obvious would be to raise only US$ 13(A)/25(B) million which, with the revenue generated from such a Fund, would be adequate to meet the deficit indicated in Table 5. Such an approach will be unacceptable because such a Fund will not provide the essential security and stability that the institution requires during its first five years. The purpose of the recommended level of funding is precisely to help overcome endemic institutional insecurity. Though the Centre should aim at attaining a state of full self-financing in its fifth year, nevertheless it should have the security that the non-attainment of such a goal will not render it insolvent.

6.7 Location of the Centre

The Centre should be located in a country and a city that provides a number of facilities and services, and that guarantees minimum freedom of action needed for the successful operation of the Centre. There are four aspects to this matter:

1. Factors that are important to the Centre.
2. Factors that are important to the staff.
3. Factors that are important to the users.
4. Other factors.

Under each, there are factors that are essential and others that are desirable.

The ultimate choice of location by the Board of Directors will necessarily depend on a careful analysis of the available options: it is to be expected that a compromise will have to be sought.

6.7.1 Factors Important to the Centre

6.7.1.1 Essential Factors

The legal status of the Centre and the privileges enumerated below are mostly based on those generally accorded to UN agencies and regional organizations and institutions of the Arab League in the Arab States.

The host country must be able to guarantee that the Centre and its staff shall have:

1. The privilege of political neutrality in all Arab affairs.
2. Freedom of Information: To facilitate its work, the Centre should be able to acquire information and be free to hold it in its library.
3. The right of the Centre to own the facilities it requires for its operations in the host country.
4. The usual waiver of duties and taxes on the Centre's imports of equipment and supplies needed for its operations on the same basis as those granted to Arab League and United Nations organizations.
5. Facilitating the movement of the Centre's staff, such as absence of visas both for entry or exit for the Centre's staff. This may be achieved by the issuing of long-term multiple-entry visas.
6. Genuine interest of the host government in technological development.
7. Availability of schools of good quality for the staff's children.
8. Availability of good quality medical services.
9. Availability of good quality staff housing at reasonable cost.
10. Efficient postal and telecommunication facilities: cables, local and international telephone, telex lines, efficient mail deliveries.
11. An efficient and well connected airport: the users of the Centre and the staff will need to travel extensively.
12. Hotel facilities: since the Centre will have a large number of guests and conference participants, it will be necessary to find adequate accomodation at reasonable notice.
13. Complete responsibility and independence of the Centre's management in the process of staffing the institution (recrutiment, extension and non-extension of the staff's contracts).

14. Honouring the full rights of the staff under the civil and criminal codes of the host country.

6.7.1.2 Desirable Factors

1. Good local computer facilities.
2. Availability of well-trained local personnel for office work: the Centre will be in need of a large number of french and english-speaking expert typists and secretaries, professional librarians and librarian aids, etc. The local unavailability of all such staff will add substantially to the cost.
3. Reasonable cost of living: an unusually high cost of living index means higher wages and higher costs.
4. The location in a university town.
5. Availability of reasonable recreational opportunities for staff and their families.

6.7.2 Factors important to staff

Several of the factors that are critical for the staff have been listed under those factors that are essential for the establishment of the Centre. These include: housing and medical facilities, schools, recreation. These factors are so critical that if they are absent, expensive programmes must be made to provide them. Otherwise, it is most unlikely that the Centre will have freedom of access to the manpower it needs.

However, an essential condition for the development of a permanent senior staff is the right of an Arab staff member to own his home and to retain ownership after resigning from the Centre. It will help the staffing of the Centre a great deal if it would be possible for the Arab staff member, after resigning from the Centre to be allowed to accept employment at other institutions in the host country or to engage in lawful private business.

Some, if not many, of the professionals that will serve on the staff of the Centre will also have a husband/wife who is also a professional. Thus it should be legally possible for the wife/husband of the staff member and their dependents to be employed, subject to existing opportunities.

The staff should be able to receive and transfer their earnings into convertible currencies; thus they should have access to appropriate banking facilities.

6.7.3 Factors important to users

Since the Centre is regional, it should be open and accessible at all times to all Arab States. Thus the host country must provide adequate guarantees that the Centre will always be accessible to other Arab nationals. It should be possible for any staff member of an Arab ministry or organization to gain entry to the host country.

6.7.4 Other factors

It is also useful to consider non-capital cities among the likely sites. Most Arab capital cities are very congested today and the cost of living is high. Such choice is subject to meeting the essential factors for the Centre referred to earlier.

It is clear from the factors that have been listed that some may be satisfied by considerable capital investment: a school, a small hospital and such facilities. This, of course, will be far less satisfactory than already existing facilities. But other problems connected with the political and social environment of the institutions cannot be so easily met.

It is recommended that the choice of the location be made by the Board of Directors after the institution has been funded. Careful study of a number of likely locations should be undertaken together with detailed discussions with potential host governments to determine the nature of the status that may be granted the Centre. The Board of Directors can entrust an independent technical committee to evaluate the different choices on the basis of clearly defined criteria approved by the Board.

6.8 Manpower, Staffing and Consultants

The effective governance, management, planning and programme management depend on a relatively small number of individuals (some 25 to 35 persons excluding the Board of Directors). Highly experienced Arab nationals with the appropriate background now exist. The selection of the senior and critical staff should be performed with considerable care. Professional competence should be a necessary pre-condition. This competence should be established critically by actual examination of the published, unpublished and occupational record of the candidate. Equally important criteria are the ability of the person to work effectively in groups, his (or her) group behaviour, his (or her) management skills and behavioural patterns under stress. In this evaluation great care should be exercised when individuals who worked and lived in radically different social and institutional environments are considered for an appointment.

It is recommended that the selection of this number of professionals be carried out through intensive interviews, reviews and study of professional records and assessment of group behaviour. This sub-group of the Centre's staff is critical to the successful establishment of the institution.

The professional staff of projects will consist of consultants and permanent staff members. Some of the individuals examined for senior positions may qualify for staff jobs. Here again, the Centre should be able to select its 100 to 250 professional staff from amongst 10,000 technically qualified persons. In order to meet its staff needs and have access to the large Arab high level manpower pool in and out of the Arab world, the Centre should establish its own brain bank.

Specialized manpower of the type needed by the Centre cannot be judged adequately from reading curriculum vitae, letters of recommendation or short interviews. It is recommended that the Centre combine three activities to enhance its communication with Arab professional manpower through:

1. Seminars: The Centre should utilize the recommended seminar and workshop programmes to study and assess individual experts. In addition to the training programmes discussed under 6.2.2.2, the Centre should organize regular one-lecture seminar activities. This need not be an expensive programme; professionals travel a great deal. Many of them would also like to visit the Centre. In return for a per diem and a modest honorarium of, say, US$ 100.-, it should be possible to sustain quite an intensive lecture series. A great deal may be learnt about a person's specialization, methodology, reliability, scholarship, personality, etc. in such a one day visit.

2. Conferences: the Centre's four or more annual conferences will also attract a large number of participants and thus develop the Centre's exposure and communication channels with professionals.

3. Travel of the Centre's staff and their participation in conferences: All staff should be involved in this activity and this programmed travel should be included in project staffing.

The selection of staff for each project should be carefully done in the light of their technical expertise, their personalities, and the nature of the project. Whenever a project of considerable duration is to be performed outside the premises of the Centre, care should be given to problems of housing, schooling, transport and health services.

The Centre should be relieved of the constraint of satisfying any geographical quotas in either staffing or the use of consultants. The Director should be concerned solely with providing the best services.

Naturally the staff and consultants of the Centre need not all be Arabs. A distinct preference should be given to Arab nationals because of the role this institution is presumed to play. However, at no time should the Centre compromise its performance because of such a policy.

Non-Arab professional manpower is available through a number of channels. It is recommended that the Centre seek the services of individuals possessing the requisite competence directly. The alternative is to secure these services through UN agencies or foreign consulting firms.

It is recommended that the Centre experiment with a variety of institutions and nationalities. The Centre should possess the documentation, expertise and imagination to examine a wide variety of cases.

6.8.1 Staffing and Career Structure

The association of a professional with an institution and the effect of this association on his performance is a subject that should receive the priority attention of the Director of the Centre. It is recommended that the Centre provide for above-average stimulating and professionally desirable working conditions. It should avoid by all means attracting persons on the basis of high remuneration or over-bidding. The salary scale should be competitive and equal to prevalent rates. What the Centre should concentrate on as its central attraction are the opportunities for professional development and self-fulfilment. The management and operations of the Centre should be such that an unqualified or disinterested person cannot go unnoticed; he will either promptly resign or be terminated. A competent, energetic and productive staff member, on the other hand, will receive explicit recognition. All reports and studies should be authored and the work of all staff and consultants be explicitly recognised. This type of organisation cannot flourish unless the Centre attracts individuals who are as concerned with the research activity and the discovery of solutions as the institution itself. Given a reasonable salary scale the reward of such staff is the successful solution of problems and professional achievement.

Substantial numbers of highly qualified professionals do not possess managerial qualities. It is very important that the bias of the career structures available at the Centre should not favour managerial posts. It should be in principle possible for senior staff members to receive salaries comparable to those of the most senior managerial officers (Chiefs and Director).

The initiation and development of an institution is a most delicate process. Any instability of the organisation and any serious setbacks in the unfolding of its programmes may have serious long range effects. It may result in the loss of staff discipline, loss of competent staff and so on. The performance of an institution of this sort is determined by a combination of a high powered intellect and idealism. The type of individuals required to make a success of such an institution are in short supply in any country. They have numerous employment opportunities. Unless the Centre provides adequate working conditions, sound and principled management, intelligent and rational programme planning and management, it is not likely to attract or retain the services of the crucial manpower that are necessary for its success.

6.9 Detailed Budget

It is not thought useful at this stage to prepare a detailed budgetary breakdown. The estimates given should be adequate for the present phase of the discussions and deliberations. It will be possible to prepare a useful detailed budget once the location has been selected and salary scales established.

7.0 Specimen Projects

The definition and discussions presented in Section 6.0 of this Report are sufficiently detailed to constitute the basis of a work programme for the first five years. But for the purpose of completeness, specimen projects for the first five years are presented. It is recommended that the Director be solely responsible for the planning and management of these projects subject to Board approval. It should be pointed out here that by the third year a considerable fraction of the Centre's activities should consist of contract projects paid for by Arab institutions. This implies that the work programme of the Centre will become dominated by such contracts.

7.1 Sample of Possible Topics for Study

The topics listed under this heading are mere suggestions to the Board of Directors of the Centre. These are by no means binding and it would be up to the Board of Directors to decide whatever areas to include in the Centre's work programme.

1. Inventory of Arab institutions and programmes dealing with technology and technology transactions (first and second years).
2. Projects inventory to include: all on-going new projects with a value exceeding US$ 1 million; technical and financial details on each project (on-going, permanent).
3. Inventory of all contracts under negotiation that involve technology transactions, to include contracts of US$ 1 million value and above (on-going, permanent).
4. Field survey of the status of the civil engineering industry in the Arab world with a view to determining: the existing capacity of this industry, its shortcomings, and the practical steps that may be taken to expand its output, reduce unit cost, expand its engineering capabilities (first year for 2 years).
5. Case studies of 100 different contracts and the negotiation strategies utilized (second year for 2 years).
6. The capacity of the traditional technology in use in the agricultural, transport, construction and manufacturing sectors for rapid change (second year for 3 years).

7. The existing technological capabilities in the Arab world in the field of design and construction of petroleum and petrochemical installations (second year for 2 years).
8. Food collection, storage and distribution in the Arab world: food losses and the means to reduce them (second year for 2 years).
9. The detailed study of a sample of 100 different Arab institutions (first year for 5 years).
10. Cost structure of civil engineering projects (second year for 2 years).
11. Cost structure of Arab iron and steel industry (second year for 2 years).
12. Cost structure of Arab refineries (third year for 2 years).
13. Cost structure of Arab petrochemical industry (third year for 2 years).
14. Arab shipping fleets: economics and transport performance (third year for 2 years).
15. Land transport: economics and management (fourth year for 2 years).
16. Economics of Arab small rural towns (population 1000 to 5000) (fourth year for 2 years).
17. Study of the management of R & D in Arab national and regional institutions (second year for 3 years).
18. Alternative patterns for supplying Arab food supplies (second year for 2 years).
19. Sub-contracting by international firms in the Arab world (first year for 4 years).
20. International contracting and procurement (first year for 4 years).
21. Technology transfer processes to Arab labour force (second year for 4 years).
22. Management and Economics of Arab harbours (third year for 3 years).
23. The production and diffusion of information in government bureaucracies (third year for 3 years).
24. Patterns of decision-making as a function of type of contract, cost and the information base (second year for 3 years).
    Licensing fees paid by Arab states (second year, on-going).
25. A study of the forward and backward linkages generated in key sectors of Arab economics: petroleum, iron and steel, cement, textiles, other (second year for 3 years).

8.0 Action Programme for the Establishment of the Centre

If the concept of an Arab Centre for the Transfer and Development of Technology is accepted by a sufficient number of Arab States and regional institutions, a number of actions will be necessary to bring about the proposed Centre. It is obvious that the steps that have to be taken fall into three distinct phases. Phase One begins after the 5th Session of the Economic Commission for Western Asia in May 1978 and after the approval of the Economic and Social Council of the League of Arab States as agreed between ECWA and the Secretariat General of the Arab League. In this phase a special follow-up committee should seek to attain in an orderly and effective manner two objectives: the establishment of the first Board of Directors and the collection of the funds pledged for the Centre. Phase Two begins when the Board of Governers and the Board of Directors meet. Phase Three begins when the first director of the Centre is appointed by the Board and assumes his responsibilities. These three phases are now discussed in greater detail.

8.1 Phase One

Expected duration: six months.

A follow-up committee of three full-time persons should be established at an official meeting of representatives of Arab States and the relevant regional institutions referred to earlier in section 6.4 organized by the Arab League and ECWA. The functions of this committee should be to:

1. Prepare the Charter and all other legal documents for signature.
2. See to it that the documents are properly signed.
3. Receive the donations and grants towards the establishment of the Centre. The transfer of these sums should be to a special trust fund under the responsibility of the five Arab development funds. The Board of Governers of the Centre becomes legally responsible for the Trust Fund at its first meeting.
4. Implement all the necessary steps for the creation of the first Board of Governers and Board of Directors.
5. Call for a meeting of the Board of Governers.
6. Present a report on the events of this phase. The follow-up committee is then automatically dissolved.

End of Phase One.

8.2 Phase Two

Expected duration: six months.

The basic function of the Board of Governers in this phase have to do with the completion of a number of important managerial and legal matters. These are to:

1. Elect the Board of Directors and its officers.
2. Establish a full-time secretariat.
3. Establish procedures and bye-laws to govern Board activity.
4. Define the legal status of the Centre and of future staff.
5. Sub-contract Preparation of "job description" and management guidelines defining:
   - the authority and responsibility of the Board, its officers and the Director. The emphasis here should be on the managerial relationship of the Director to the Board and its officers, as well as on the authority the Director must be granted to fulfil the objectives of the Centre;
   - the explicit criteria and methods that will be used to assess the performance of the Director.
6. Develop detailed criteria and a negotiation strategy for the selection of the Centre's location.
7. Begin preliminary surveys and negotiations for comparing alternative sites.
8. Select location after arriving at a clear and comprehensive agreement on the status, privileges, responsibilities of both the Centre, its staff and host government.[1]
9. Establish a Finance Committee for the management of the Trust Fund.
10. Establish a Committee of the Board to search for a Director. This Committee should nominate its candidate(s) to the Board for final selection within six months.

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[1] The Board of Governers may decide that it should make the final decision concerning the choice of location on the basis of a recommendation submitted by the Board of Directors. If the Board of Governers so decides then it must schedule a second meeting to be held within one year.

11. Appoint an external auditor for the Centre.

Phase two ends when the Director is appointed and assumes his duties. It is assumed that by this time, the entire sum for the establishment of the Centre has been received.

8.3 Phase Three

Expected duration: one year.

During this phase, objectives are to be translated into detailed plans. Facilities, management procedures, accounting systems etc. have to be planned and implemented. Massive effort to establish substantial data banks and library facilities has to be made. In more detail:

1. The Director should identify and appoint a number of key staff members. All those holding senior management positions can only be appointed by the Board of Directors upon the recommendation of the Director.
2. The Director should initiate planning the Centre's programme. A draft plan should be submitted within six months of the beginning of his appointment.
3. The Director, with the Board's approval, may initiate a few projects before the completion of the full programme.
4. The Board of Directors may embark on a small programme of visits to individual Arab states and begin its own long term planning for the governance of the Centre.

Phase three ends when the first programme has been submitted by the Director and approved by the Board.

Subsequent to Phase Three, the Centre should operate on the basis of programmes submitted by the Director and approved by the Board.

9.0 The Euro-Arab Dialogue and the Arab Regional Centre

At a meeting of the Arab *ad-hoc* group on the Transfer of Technology in the Euro-Arab Dialogue held at the Arab League between 21-22 September, 1978, the proposed Centre for the Transfer and Development of Technology was adopted as the instrument through which Euro-Arab discussions on technology may be channelled (see Annex V).

The spirit of co-operation and interdependence reflected in the various statements and documents emanating from the Euro-Arab meetings on this topic constitute a beginning for the initiation of mutually beneficial programmes and projects.

It is clear that the European Community and the proposed Centre are committed to the furtherance of the same fundamental objective: the technological self-reliance of the Arab States. The contributions of the European Community and the Centre towards the achievement of this goal are fundamentally complementary: the European community possesses the scientific and technological knowledge and institutions while the proposed Centre is to endeavor to operate on the policy level with a view to assisting the Arab States to achieve a more satisfactory utilization of national and regional technological resources as well as to assist in the building and development of national and regional institutions directly or indirectly involved in the process of technical transformation.

The European Community may be invited to contribute to the operations of the Centre and even more importantly to work jointly with the Center in major co-operative programmes dedicated to the transfer and development of Arab technological capabilities.

Under the first type of activities, the European Community could contribute to the development of the information and data base of the Centre, facilitate co-operation with European Centres, contribute the services of European consultants the Centre may require. In the second domain, the possibilities are unlimited as may be seen from the following brief review.

The Arab States are currently depending on foreign firms for the design, planning and execution of projects probably in excess of $ 50 billion annually. An additional $ 25 billion (approximately) are spent on the purchases of the industrial products (inclusion of weapons) as well as agricultural products. A number of difficulties and problems associated with these transactions have been indicated in sections 3.0 to 5.0. In view of the determined policies of Arab States to solve these problems and to increase the benefits accruing from their development plans to the entire population a number of major measures are indicated.

Whereas the European Community receives an important share of Arab projects and the Arab world is a significant market for its product the opportunities for fruitful co-operation abound. One approach to the identification of specific areas of technology for Euro-Arab consideration may be to focus on the major components of the two to three trillion dollars to be spent before the year 2000 by the Arab States abroad. One thus can construct a small set of technological areas that are of vital importance to the Arab States. The precise actions to be taken and the opportunities for Euro-Arab co-operation have to be studied for each individual case. Naturally, the Arab side is primarily concerned with the acquisition of the technological capacity associated with each particular area. The following areas are presented for illustrative purposes:

1. Civil Engineering

The expected expenditure on projects in this sector will probably exceed one trillion dollars over the 1979-2000 period. In this sector is included: housing, transport system (land, sea, air), sea defences, dams, drainage and irrigation,sewage disposal, public and industrial buildings. Demand will continue to increase for an indefinite period because of severe shortage, population growth and the demands of the development programme of the Arab States. There exists considerable technical manpower and facilities within the Arab world. Yet these need to be further developed and expanded to a level commensurate with demand.

2. Petroleum and Petrochemicals

The expected expenditure on this industry over the period 1979-2000 is expected to exceed one trillion dollars. Furthermore, petroleum being a major Arab resource, there is every reason to establish comprehensive Arab technological capabilities in all fields of this industry.

3. Iron and Steel

Additional expenditure of the order of $ 100 billion are expected before the year 2000. The Arab metallurgical industry is young and is still in its early growth phase. Suitable institutions for planning, designing, managing, and R&D, and training are still either lacking or require rapid development.

4. Arid Zone Agriculture

Little expenditure is presently expected to be made in this area; however, the fuller utilization of the extensive arid zones may contribute to the reduction of imports of agricultural products, now at 50% of Arab consumption and on the increase. Most of the Arab world falls in the arid zone. Consequently, the flora and fauna of the region are strikingly different from that of Europe. However, the rapid development of this resource requires the acquisition by Arab institutions (with emphasis on universities) of a fuller grasp of the biological sciences. The combination of modern biological sciences with extensive Arab traditional knowledge of the desert should contribute to the breeding of desert animals for their milk and meat as well as the instituting of more effective management of desert pastures.

5. Fisheries

Expenditure on this topic is not considerable. Yet, the need for protein rich food and the closeness of two of the world's richest fishing areas to the Arab coasts (off East and West Africa) as well as the potential of inland waterways indicates significant opportunities for Euro-Arab co-operation in the transfer of European technology to the Arab States.

6. Construction Materials

A substantial portion of the cost of civil works goes towards construction material. It is expected that the demand for this material will remain high. This industry still lacks adequate engineering and R&D support. Appropriate institutions and facilities may be identified and established within the framework of Euro-Arab co-operation.

7. Health

The improvement of the standards of health in the Arab States is crucially dependent on clean water supplies and sewage disposal. Both of these fall essentially under civil works. In addition to the provision of these two basics, there is a need for suitable medical care systems that can reach rural areas and the under-priviliged. Naturally, the improvement of nutrition has a direct bearing on health.

8. Food Industry

The storage, processing, industrialization of agricultural produce in the Arab world requires considerable development. In all of these areas, European technology is of very high standing and could play crucial roles in the development of appropriate Arab institutions for coping with the problems. Furthermore, there exists considerable opportunities for establishing suitable institutions that can promote the development of Arab gastronomy in relation to the potential products of the region (e.g. camel meat and camel milk) and the evolving taste of the population.

9. Engineering Industries

The need of the Arab States for a capital goods industrial sector is considerable. There again European expertise could play useful roles in the development of the appropriate firms and skills.

10. Culture and Tourism

Considerable and increasing public and private resources are expended on this sector. Furthermore, the rich cultural inheritance of the Arab world has not yet been fully developed for the benefit of either its people or foreign tourists. Today , cultural and touristic activities involve considerable technological expertise and infrastructure. This may range from the production of toys, books, musical instruments, to the architecture of theatres and concert halls. The education of cooks, waiters, decorators, technicians, is, of course, an integral part of this industry. Again here Europe can offer unparalleled expertise.

11. Electronics and communication

This sector is highly underdeveloped in the Arab States. Numerous Arab States are currently involved in major and multi-billion dollar programmes designed to extend existing telephone systems. There is still considerable scope for expanding on these programmes - what with a doubling of the population by the year 2000 and immense expanse of the Arab world (14 million Sq.Kms). In addition to the strictly communication aspects, the Arab world is a major market for consumer electronics (radios, hi-fis, TV's), electronic devices and computers for process control, radar and military systems. Here, opportunities for joint Euro-Arab action may be instumental in developing the European and Arab industry in the face of international competition.

ANNEXES

ANNEX I

Findings of Interagency Missions to the Arab States

Immediately after the Preparatory Interagency meeting of 24-28 October 1977, the missions experts from ECWA and the other participating agencies had extensive discussions and briefings (see 1.0). The ECWA Secretariat had already notified the relevant authorities in each Arab State concerning the missions and had requested appointments with government officials. It was unfortunately impossible to arrange for visits to Oman [1] and Somalia. Otherwise, nineteen Arab States were visited. A total of 203 persons were met and 15 different persons participated on the teams of the missions.

The purpose of the missions was to acquire factual and attitudinal information on policies that bear directly on the acquisition of techniques, capital goods and products and the perception of technological problems and issues.

The Arab world was divided in two parts:

Mission one: Lebanon, Syria, Jordan, Egypt, Sudan, Libya, Tunisia, Algeria, Morocco and Mauritania.

Mission Two: Iraq, Kuwait, Bahrain, Qatar, UAE, Oman [1] (not visited), Saudi Arabia, Yemen Arab Republic, Djibouti, Somalia (not visited) and People's Democratic Republic of Yemen.

The date each country was visited, the names of the visiting team members, and the officials met are given in Annex II.

During the fifty days of these visits, the team sought to acquire answers to questions of importance to the design of the Centre. A summary of these findings is presented below. It does not exhaust the impact of the findings of the field missions on this Report. In fact the definitions of the functions of the Centre and the recommended organization and governance depend heavily on the comments of the respondents.

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[1] Oman was later on visited by the team leader of the second mission.

Summary of the basic findings of the two missions

In summarizing the findings of the two missions, it was not deemed useful to specify the sources of the views expressed.

Attitudes towards concept

The overwhelming majority of the persons interviewed were in favour of the concept of establishing an Arab Regional Centre for the Transfer and Development of Technology. However, the support the concept received was tempered by a number of major or minor reservations and concerns. These concerns had to do with the quality of the work to be undertaken, the possibility of creating an effective Centre, the avoidance of duplication and the relationships between the proposed Centre and national institutions.

On a number of occasions, officials were concerned with whether the development of national centres should precede the establishment of a regional centre. Here a number of contradictory positions could be identified: for some officials, gaps in the capabilities of existing institutions constitute the only justification for a regional centre; yet for others, unless all institutional gaps are filled on the national level "the co-ordinating role of the regional centre, which should be its priority function, will have little substance", (to quote one of the country reports). The officials of two countries expressed strong reservations: in the first country, these reservations were based on the fact that industry was totally in the private sector; in the second country, the reservation was based on their observation that the performance of Arab regional institutions has not so far been effective.

Linkage to national institutions

Several of the Arab States had already established a number of institutions to cope with the variety of scientific and technological problems. In all of these countries the importance of effective relationships between the national institutions and the proposed Centre was emphasized. It was argued that the communication between the proposed Centre and the national institutions should be at the highest level. Among its services, the Centre should provide these national institutions with information, advice, training and assistance in institution building.

Countries that have not yet established an adequate system of institutions believed that the proposed Centre could provide them with valuable services on a problem-by-problem basis. (The priority functions are discussed below).

The proposed Centre was called upon to prepare comprehensive information on science and technology institutions in the Arab world and to contribute to a more effective utilization of existing institutions.

Access to the services of the proposed Center

The need for simple and effective mechanisms through which individual Arab States and national institutions can communicate with the proposed Centre was emphasized.

Countries where R&D is very limited or non-existent appeared worried about their chances of interacting and communicating with the proposed Center. Some of the interviewed officials stressed the difficulties met by regional organizations in securing information from member states. Furthermore, there was some dissatisfaction with the type of information governments receive from regional and international organizations.

Officials in countries with developed institutional infrastructure emphasized the need to channel communication through national centres.

Communication was suggested to be in two ways: either initiated by institution(s) in each Arab State; or initiated by the proposed Centre. Furthermore, the publications and data banks themselves will be sought after by "users" without the assistance of the Centre's staff.

Overlap, Co-ordination and Duplication

The problems of duplicating existing (e.g. IDCAS) or planned institutions and of co-ordinating existing activity were repeatedly stressed. In particular, the Centre to be established by the Economic Commission for Africa, the proposed Euro-Arab Technology Transfer Centre as well as the institutions and Fund for Scientific Research recommended by CASTARAB were discussed in relation to the proposed Arab Regional Centre for the Transfer and Development of Technology.

It was generally agreed that the proposed Centre could render a useful service by contributing to the co-ordination, integration and mobilization of existing institutions - whether international, regional or national.

It was emphasized that national centres are essential to the technological development of each country. The proposed regional Centre can only play an advisory and supportive role to national centres.

Range and diversity of Arab technology needs

A number of officials emphasized the immense differences in the social, economic and technological needs of the different Arab States as well as of the differences in their absorptive capacity for technology. A number of suggestions were made on how the proposed Centre could cope with this problem. It was not deemed necessary or useful that all Arab States participate in all programmes. It was proposed that sub-regions, or a group of countries facing similar problems, may have specifically designed programmes.

It was clear that most officials appreciated the wide range and diversity of problems that should be of concern to the proposed Centre. On the other hand, it was realized that the proposed Centre must specialize and could not endeavour to meet all the expressed needs.

The complexity of this problem may be seen in the observations made on the subject of training. Most officials indicated the need for this service and discussed briefly their needs. These needs ranged from vocational training of agricultural extension workers to specialized training in policy formation with particular emphasis on medium level training.

It is clear that one of the challenges facing the proposed Centre is the development of a strategy that succeds in providing tailored services, yet the Center itself is not directly responsible for performing the detailed works on the national level. A close co-operation between the proposed Centre and national institutions within the framework of imaginative strategies may hold the key.

The functions having the highest priority

One of the basic objectives of the two missions that visited the Arab States and consulted with responsible government officials was to secure as accurate an opinion as possible on what functions are deemed to be the most urgent and needed at this time. This information is important at the planning stage because the Centre must be established to provide services in actual demand. Naturally, the assessment of the situation and the interpretation of interview statementsin such a broad field are subject to both error and the bias of the interviewer. Notwithstanding all of these difficulties one is pleasantly surprised to note considerable unanimity on the subject of the priority functions.

At the Preparatory Interagency Meeting on the Arab Centre for the Transfer and Development of Technology (E/ECWA/NR/9, October 1977) the experts identified functions (modules) 1, 7 and 9 as having the highest priority (A) and functions (modules) 10 and 11 as having the next highest priority (B)[1]. The missions country reports have addressed themselves to this problem of priorities of functions. The definition of the functions do not always correspond exactly to those in the Working Paper. However, if one takes function 1 to include licensing agreements, contract design and negotiations, function 10 to include a wide variety of "tailor-made" information services, and function 8 to cover training on virtually all levels, the country scores are as entered in Table 6. The scores presented in Table 6 are computed by allocating one point to each country for each of three choices. Since 19 countries responded to this topic, the maximum expected score should be 57 and the maximum score per function 19. The score in Table 6 adds up to 48 because some of the functions selected fell under Planning and Services (previously called Permanent Programme).[2] The functions listed under this Programme received heavy emphasis.

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[1] See Table 6

[2] The Planning and Services referred to as the "Permanent Programme" and "Core Programme" in earlier versions covered the following activities in the Working Paper: Seminars and Advanced Training; Conferences; nomination of Consultants; Institution Building; Preparation of Requests for Proposals and Unsolicited Research.

Table 6

The rating of the eleven basic functions of the proposed Arab Regional Centre for the Transfer and Development of Technology

Functions (Modules)	Preparatory Interagency Meeting Ratings	Country Scores
1. Policy Design	A	8
2. Project Support	–	1
3. Technological Transfer to the Traditional Sector of the Economy	–	–
4. Sectoral Emphasis	–	3
5. Support Services of Technology Users	–	–
6. Development of Appropriate Technology (hardware R&D)	–	–
7. Regulating the Inflow of Tools, Techniques and Technology	A	–
8. Research and Training	–	11 (training only)
9. Co-ordination and Integration	A	6
10. Information Transfer	B	14
11. Development of Appropriate Technology	B	5

In the mission evaluation of the responses of officials there was considerable overlap between functions 1 and 7. On the other hand, function 8, when discussed during the first interagency meeting, received considerable attention regarding training. Research was not deemed to be essential to this function. This accounts for the apparent differences between the two assessments of priorities.

Though most officials interviewed were concerned with co-ordinating and integrating the activities of existing institutions, yet when these were asked to select the three most vital functions, function 9 was given a relatively lower rating. It should be noted here that there is some difference between conception and scope of co-ordination and integration as reflected by the officials interviewed and the services noted in function 9 (see Working Paper, Para 6.2.9). In most cases, the officials emphasized the need to co-ordinate the activities of national and regional centres of technology. In function 9 it is proposed that the Centre under consideration should go beyond this limited institutional framework. For example, the Centre may contribute to the co-ordination and integration of a broader set of institutions as well as contribute analyses and studies of development plans with a view to the integration of existing Arab sources of technology with requirements. This latter activity was discussed by some respondents as part of function 1.

A careful synthesis of the discussions, observations and analyses, of the mission findings indicate that the priorities emphasized, in addition to those enumerated under "Planning and Services", consisted of:

1. Information services designed to address complex and sophisticated problems. In other words, a service moving beyond documentation and closer to a pre-feasibility service in some cases.
2. Policy design with special emphasis on services in support of: contract negotiations, licensing, project design, technological development policies.
3. Training programmes and assistance with institution building.
4. Co-ordination and integration.
5. Development of appropriate technology (function 11): The establishment of detailed criteria for the assessment off appropriateness of new technologies whether generated in the Arab world or imported; thé development of methodologies for the generation of appropriate technologies at existing R & D Centres in the Arab world; the study of the implications of specific appropriate technologies to public policies in the field of investment, trade, education, labour; the critical assessment of what is happening in the Arab world in the field of technology; the study of successful examples of appropriate technology throughout the world; the diffusion of this information in the Arab States.

Considering the strong overlap between the considered opinion of the experts at the Preparatory Interagency Meeting (October 1977) and the strong avoidance of functions listed under 2, 3, 5, 6 as well as the limited emphasis on function 4 leads us to plan the feasibility study on the basis of the five above mentioned priorities. These functions were redefined in the light of the findings of the missions. Further discussion and analysis of these functions were given in the previous sections of this report.

Priority Technologies

The missions attempted to solicit opinion on the priority technologies that should be emphasized by the proposed Centre. Food and Agriculture were the topics most cited. However, different officials emphasized different aspects of these technologies ranging from mechanization of agriculture to land reclamation.

In the mining and industrial sector, petroleum and petrochemicals naturally led the way among the major topics. Textile industries, iron and steel, pharmaceuticals, construction materials, hydro-electric power, engineering industries received scattered interest. Research in solar and nuclear energy sources was also considered by some to be of prime importance.

It was not clear from the discussions whether the respondants thought the proposed Centre should engage in research work in these technological fields or should provide supportive policy planning services to institutions and governments in the region. The high cost of physical and hardware research was pointed out in the Working Paper and the initial scale of the proposed Centre could not permit significant activity in hardware and physical research and development. Initially, the expectation was that such activity will be undertaken in existing and new specialized national and regional institutions. The proposed Centre could, however, provide valuable services in planning such new institutions.

Dissatisfaction with existing regional institutions and the desired quality of work

In a number of quarters, criticism of the performance of existing regional centre was voiced and officials intimated that their support of the concept will depend on the quality and standards of the work produced at the proposed Centre. Here a number of observations were usually made concerning the governance, staffing, financing and independence of the proposed Centre.

A few respondents urged that a study of the causes of the presumed poor performance of existing regional institutions be included in the feasibility study. Others suggested that a detailed survey of the performance of existing institutions should be the priority task of the proposed Centre.

Arab brain drain and the proposed Centre

A number of comments were made on the role that the proposed Centre may play in reversing the continuing Arab brain drain.

Financing the Centre

Comments on the financing of the proposed Centre were expressed in a number of countries and by officials of some of the Arab funds and national development banks. In view of the scale of Arab purchases of capital goods and technical services, and the size of the development budgets of most Arab States, the financing of the proposed Centre was not expected to pose serious obstacles. In fact, a number of responsible officers intimated that their organization would be agreeable to providing substantial support.

Some quarters argued that the proposed Centre should not be tied to the Fund for Scientific Research now in the planning phase because of the delays this may entail. However, the activities proposed for the Centre will not involve scientific research into either pure or applied science but will rather fall in the areas of policy planning, contract negotiations, project design and the like. Thus it is unlikely that the policies of the proposed Fund would support the Centre's activities. Needless to say, the Fund for Scientific Research and the Centre can play mutually reinforcing, complementary and non-overlapping roles.

Financial stability and autonomy as well as the sources of finance and its relationship to location and governance received limited attention. Some observed that the location of the proposed Centre should not be determined purely by the financial contribution of a single state.

The respondents also raised a number of issues concerning whether the services rendered by the Centre will be free or paid for on a cost recovery and not profit making basis.

Location of the Centre

A number of officials expressed some observations on the choice of location. The availability of qualified and experienced human resources, the independence of the Centre, the ease of communication and travel were cited as important factors in the selection of the location.

Governance and management

The attitude of most of the officials who addressed themselves to this topic appeared to favour the establishment of an independent Centre, the management and staffing to be completely on the basis of competence and not on national quotas. A number of models and mechanisims for the overall governance of the Centre were suggested. For example, the AFSED and OAPEC models were cited by some. Others suggested that representatives from the national technology centres constitute the Board of Governers and that this body elect an executive committee. It was felt that voting rights in the governing body should not reflect the level of financing. For this reason some respondents felt that there should be considerable diversification in the sources of income and long range financial stability to endow the proposed institution with the requisite managerial autonomy.

It was generally believed that the proposed institution should be sufficiently autonomous to take initiatives, to plan, to execute its programmes and implement its own policies. These characteristics were deemed essential to the success of the concept.

The name of the Centre

The name of the Centre is long and cumbersome and not a few individuals found fault with the use of the word transfer. It is recommended that the Centre be named after one of the great practical engineers of Arab science. However, this matter should be left to the founding governing body.

ANNEX II

LIST OF INSTITUTIONS AND NAMES OF OFFICIALS VISITED BY MISSIONS IN THE ARAB COUNTRIES

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Office represented
ALGERIA	Mr. M.T. Muntassir Mr. M. Saad	Mr. M. Fasla	Director, International Relations, Ministry of Foreign Affairs.
8–11 December 1977	Mr. K.A. Sabet	Mr. M. Isly	Director, National Institute of Industrial Productivity and Development (INPED)
		Mr. K. Belhocine	JNERI, Ministry of Light Industries.
		Mr. M. Belkacemi	External Relations, Ministry of Foreign Affairs.
		Mr. A. Benkalifa	INPED
		Mme Baya Ousmer	Director, National Institute of Standards and Industrial Properties (INAPI)
		Mr. Hasene	Ministry of Light Industries.
		Mr. Meghricha	Ministry of Light Industries.
		Mr. K. Fasnouni	Ministry of Light Industries.
BAHRAIN			
14–15 November 1977	Dr. T. Al-Khudayri	Mr. Saeed Ahmad	Director, Vocational Training Section Ministry of Labour and Social Affairs
	Mr. Ismail Siam Mr. R. Faruqi Mr. S. Al-Amari	Mr. Yusuf Khaja	Director, Light Industries Sector, and Co-ordinator for UN Conference on Science and Technology. Ministry of Development and Industry.
		Mr. Dhafer A. Al-Umran	Director, Economic and Planning Affairs Ministry of Finance and National Economy.
		Mrs. Safa Daghir	Director, Cultural Affairs, Ministry of Education.
		Mr. Hasan Fakhro	General Manager of Bahrain National Oil Co., Co-ordinator of the proposed Bahrain Science and Research Center.
		Mr. Yusuf Abdel-Rahman	Official, Bahrain National Oil Company.

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Office represented
REPUBLIC OF DJIBOUTI	Dr. M.S. Fayyad	H.E. Hasan Goled Aptidon	The President
9–10 November 1977	Mr. S. Al-Ammari	H.E. Ahmad Dini	The Prime Minister
	Mr. Ismail Siam	H.E. Abdullah Mohamed Kamel	Minister of Foreign Affairs
		H.E. Idris Farehi	Minister of Agriculture and Animal Wealth
		H.E. Mohammad Jamea Olebi	Minister of Trade, Communications & Tourism
		H.E. Ali Mohammadi	Minister of Industry, Power and Water
		Mr. Ibrahim Ali Hamed	Director of Prime Minister's Office
		Mr. Francois Fichant	Director of College Technique
		Mr. Robert Ferry	Acting Director of Geological Research Centre.
EGYPT	Mr. M.T. Muntassir	H.E. Dr. Moustapha Kamal Helmi	Minister of Education and Scientific Research.
17–25 November 1977	Mr. M. Saad	H.E. Dr. Mouhamad Abdul Mouneim Abu Al Azm	President of the Academy of Scientific Research and Technology
	Mr. A. Shuman	Dr. Mouhamad Kamal Mahmoud	Director of the National Research Centre
	Mr. K.A. Sabet	Dr. Mahmoud Ali Hassan	Chairman, Building Research Council of the Academy
	Mr. M. Soubra	Dr. Abu Al Foutouh Abdullatif	Secretary General of the Academy
		Dr. Ahmad Mouhamad Gad	Supervisor, National Information and Documentation Center.

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or office represented
EGYPT (cont'd)		Dr. Ahmad Samih Al-Noukrachi	Supervisor on R&D activities in the Academy
		Dr. Abdel Fattah Rozek	Supervisor on scientific relations (Academy)
		Dr. Mouhammad Hassan Fadl	Director, Industrial Research Programme of the Academy.
		Dr. Mouhammad Hilal	Member of the Technical Office of the President of the Academy.
		Dr. Othman Mohamed Jalal	National Research Centre.
		Dr. Youssef Moursi Hussein	Director, Research Policy Unit of the Academy
		Dr. Ibrahim El Ghatwari	Under Secretary for Planning, Ministry of Agriculture.
IRAQ	Dr. T. Al-Khudayri	Dr. Taha El-Naini	President, Technical University
2-7 November 1977	Mr. A. Kocherid	Mr. Rajih Mohi-El-Din	Director-General, Department of Design, State Organization for Oil Projects, Ministry of Oil
	Mr. F.J. Pidgeon Mr. Ismail Siam	Mr. Ismail Alwan Al Dulami	Director-General, Manpower and Education Department, Ministry of Planning.
	Mr. R. Faruqi	Mr. Bahjat Abdullah El Ani	President, State Organization for Industrial Design and Construction, Ministry of Industry and Minerals
		Mr. Osama Hamadi	Engineering Manager, Petrochemical Industries, State Organization for Industrial Design and Construction.
		Mr. Adnan A.M. Al-Ani	Head, Petrochemical Industrial Department, State Organization for Industrial Design and Construction.
		Mr. G. Ayoub	Director General of Industrial Research & Control, State Organization of Industrial Development

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Office represented
IRAQ (cont'd)		Mr. Mohamad Idris	Chief Engineer, State Organization for Industrial Design and Construction.
		Dr. Farhang Jallal	President, State Organization for Industrial Development
		Mr. Ismail Bazzaz	President, Specialized Institute for Engineering Industries.
		Dr. Tooma El-Bander	Acting Director-General, The Scientific Research Foundation.
		Dr. Ghazi Darwish	Professor, University of Baghdad and Head, Transfer and Technology Unit, The Scientific Research Foundation.
		Dr. Rauf Zainul-Abideen	Director, Industrial Research, The Scientific Research Foundation.
		Dr. Mahmood Clor	Director, Agricultural Research, The Scientific Research Foundation.
		Dr. Adnan El Adeeb	Director, Building Centre, The Scientific Research Foundation.
		Dr. Nouri Abdel Kader	Director, Natural Resources Applied Research Institute, The Scientific Research Foundation
		Dr. Salman Rasheed Salman	Assistant Professor, Baghdad University and Official, Scientific Research Foundation.
		Miss Ibtisam Al-Khalili	Transfer Technology Unit, The Scientific Research Foundation.
		Mr. Sabah Kachachi	Senior Consultant, Ministry of Planning: Industry Section.
		Dr. Jaffer Abdul Ghani	Senior Adviser; Ministry of Planning: Industry Section.
		Dr. Mehdi Habib	Acting Secretary-General and Head of Technical Services, Organization of Specification and Measurement (Bureau of Standards).

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Office represented
IRAQ (cont'd)		Mr. Mahdi Al Orfali	Chief of Administration and Finance, Organization of Specification and Measurement (Bureau of Standards)
		Mr. Farid Succar	Head Specification Department, Organization of Specification and Measurement (Bureau of Standards).
		Dr. Abdul Wahab Al-Dahiri	Director, Economics Department; Higher Council of Agriculture.
JORDAN 11-16 November 1977	Mr. M.T. Muntassir	Dr. Albert Butros	Director General, Royal Scientific Society
	Mr. M. Saad	Dr. Hashem Dabbas	Under-Secretary, Ministry of Trade and Industry
	Mr. F. Hilmy	Dr. Ziad Annab	Director-General, Industrial Development Bank
	Mr. A. Shuman	Dr. Abdullah Al-Khatib	Director, Planning and Development Department, Royal Scientific Society.
		Mr. Ali Dajani	President, Chamber of Industry
		Mr. Jawad Al Anani	Under-Secretary, Ministry of Labour.
		Mr. Samir Hamdan	Royal Scientific Society
		Mr. Shafic Al Husseini	Ministry of Agriculture.
		Mr. Sami Al Sunnah	Deputy Director General, Agricultural and Land Organization.
		Mr. Hanna Odeh	President of the National Planning Council
		Mr. Ibrahim Fakhess	Director, Department of Chemical Industries.
		Mr. Souheil Al-Mallah	Administrative Director, Ministry of Trade and Industry.
		Mr. Mohammad Al Sakkaf	Director, Economic Co-operation Department; Ministry of Trade and Industry.

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
JORDAN (cont'd)		Mr. Mu'auia Al Khamash	Director, Companies and Commercial Registration Department.
		Mr. Salah Ali Rida	Director, Department of Commerce; Ministry of Trade and Industry.
KUWAIT 8-13 November 1977	Dr. T. Al-Khudayri Mr. R. Faruqi Mr. S. Al-Ammari Mr. A. Kecherid Mr. Ismail Sian	Dr. Fikri Khalaf	Technical Co-operation Department: Ministry of Planning.
		Dr. Mohamed Shanaa	Technical Expert responsible for United Nations project; Ministry of Planning
		Miss Marian Al Awadi	Technical Co-operation Department, Ministry of Planning
		Mrs. Makkiya Dashti	Technical Co-operation Department Ministry of Planning
		Mr. Daoud Naaman	Responsible for United Nations experts; Technical Co-operation Department, Ministry of Planning.
		Dr. Adnan Shahabuddin	Director-General, Kuwait Institute for Scientific Research (KISR)
		Dr. George Abid	Special Adviser to Director-General; KISR
		Dr. Al-Omar	Director of Research; KISR
		Dr. Afzal	Director, Science & Technology Policy Division (STP Division); KISR
		Dr. George	Techno-Economic Section, STP Division; KISR
		Dr. Ghanin	Techno-Economic Section, STP Division, KISR
		Dr. Mohamed Zuheri	Director, Documentation and Information Division; KISR
		Dr. Nabil Al Yassini	Researcher, Engineering Department; KISR

ountry and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
WAIT (cont'd)		Mr. Ahmad Al Adasani	Director, Water Resources Development Centre, Ministry of Electricity and Water.
		Dr. Mohamed Wasil Al-Thaher	Dean, Science Faculty, University of Kuwait
		Dr. Abbas Ali Khan	Assistant Dean, Engineering Faculty, University of Kuwait.
		Mr. Najeeb J. Al Foraih	Director of Industrial Development & Consulting Bureau; Ministry of Commerce and Industry.
		Dr. Ahmed Mohamed El-Behery	Technical Adviser (UNIDO); Ministry of Commerce and Industry
		Dr. Fouad Abdullah	Director, Economic Department; the Industrial Bank of Kuwait
		Dr. Ziad Taqiaqi	Economic Research Department ; Industrial Bank of Kuwait
		Mr. Brinsley Sheridan	Manager, Corporate Planning and Development, Petrochemical Industries Company.
		Mr. Craig M. Houston	Economist, Petrochemical Industries Company.
		Mr. Abdullah Al Juhaim	Petrochemical Industries Company
		Dr. Mahmoud Amin	Assistant Secretary-General, Technical Affairs. Organization of Arab Petroleum Exporting Countries (OAPEC)
		Dr. Abdul Aziz Al-Watari	Adviser on Technical Affairs (OAPEC)

Country and date	Member of UNECWA interagency Mission	Officials met	Institutions or Offices represented
LEBANON 1-6 November 1977	Mr. M.T. Muntassir Mr. M. Saad Mr. C. Baron Mr. F. Hilmi	H.E. Dr. Selim El-Hoss	The Prime Minister
		H.E. Mr. Michel Dounet	Minister of Industry and Petroleum
		Mr. Ibrahim Kharma	Ambassador, and Director-General, International Relations, Ministry of Foreign Affairs.
		Mr. Joseph Naffaa	Director-General, National Council for Scientific Research.
		Mr. Elias Maalouf	National Council for Scientific Research
		Dr. Sabah El-Haj	General Secretary, National Council for Development and Construction.
LIBYA 6-10 December 1977	Mr. Mouhieddine Soubra	Dr. Ibrahim Adly	Resident Representative, UNDP Office, Tripoli.
		Mr. Ahmad Sabi'	Deputy Resident Representative, UNDP Office, Tripoli.
		Mr. Mahmoud Balazi	Director, Technical Co-operation Department, Ministry of Planning.
		Mr. Journaah Salem	Engineer, Ministry of Planning and Member of the National Committee responsible for the preparation for the United Nations Conference on Science & Technology for Development.
		Mr. Faysal Zayed	Director-General, Industrial Research Centre.
		Mr. Abdel-Magid Ben Saad	Director, Agricultural Research Centre.
		Mr. Taher Shaglouf	Director, Planning Department, Ministry of Industry.
		Mr. Mahjoub Araybe	Chief, Technical Co-operation Division; Ministry of Industry.

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
LIBYA (cont'd)		Mr. Mahmoud Al-Ziglaa'i	Chief, Follow-up Unit, Planning Department Ministry of Industry.
		Mr. Karim Al-Firgiani	Director, Technical Department, Ministry of Petroleum
		Mr. Mohamed Khaled Sultan	Projects Unit, Technical Department, Ministry of Petroleum.
MAURITANIA 12-14 December 1977	Mr. M. Soubra	Mr. Moustapha Ould Abdel-Rahman	Director-General, Ministry of Planning
		Mr. Baba Ahmedyeica	Director-General, Ministry of Industry.
		Mr. Diop Demba	Chief of the Training Division, Ministry of Agriculture.
MOROCCO 11-16 December 1977	Mr. M.T. Muntassir Mr. M. Saad Mr. K.A. Sabet	Mr. A. Zhiri	Chef de Cabinet and Chief of Scientific Research and Technology Division, Ministry of National Education.
		Mr. Haddaoui	Chief of Training Division, Ministry of Transport and Equipment
		Mr. A. Cherkaoui	Secretary-General of the State Department For Planning and Regional Development.
		Mr. J. Ouajjou	Secretary-General of the Ministry of Labour and Professional Training.
		Mr. Aloui Kacimi	Director-General of (SUBM) Beni-Mella Sugar Company.
		Mr. Hakkou	Ministry of Labour and Professional Training.

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
SULTANATE OF OMAN 12-13 December 1977	Dr. T.Al-Khudayri	Mr. S. Barakat Al-Lenky	Director-General of Industry, Ministry of Commerce and Industry.
		Mr. Salim Maki	Director-General, Economics Department, Ministry of Foreign Affairs.
QATAR 16-17 November	Dr. T. Al-Khudayri Mr. R. Faruqi Mr. S. Al-Ammari Mr. Ismail Sian	A.- Interdepartmental Panel Meeting Consisting of:	
		Mr. Mohammad Y. Al-Ali	Director, Electricity Department and Focal Point for Euro-Arab Dialogue on Technology Transfer, Ministry of Electricity and Water.
		Mr. Lutfi El-Abed	Co-ordinator of United Nations Technical Assistance, Office of the Amir.
		Mr. M.H. Abdul-Sattar	Official, Industrial Development Technical Centre.
		Mr. Ismail El-Ghandour	Official, Industrial Development Technical Centre.
		Mr. Michael Farah	Official, Ministry of Industry and Agriculture.
		Mr. Ali Hanan Khalaf	Official, Ministry of Economy and Commerce
		Mr. Mobarak Rashid Al-Boanain	Official, Ministry of Foreign Affairs.
		Prof. Tahir Abdul Razzak	Faculty of Education, Qatar University.
		Dr. Ali A. Laz	Mathematics Department, Qatar University.
		Mr. A. El Attrash	UNDP Representative to the Government of Qatar.

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
QATAR (cont'd)		B.- Independent Meeting with:	
		Mr. M.H. Abdul-Sattar	Official, Industrial Development Technical Centre.
		Mr. Ismail El-Ghandour	Official, Industrial Development Technical Centre.
SAUDI ARABIA 30 November - 4 December 1977	Dr. M.S. Fayyad Mr. R. Faruqi Mr. S. Al-Ammari Mr. A. Kecherid Mr. Ismail Siam	Dr. Mohamed F. Khatrawi	Head, Industrial Research Department, Industrial Studies & Development Centre (ISDC) (Riyadh).
		Mr. Nasser Al Munawar	Industrial Research Department; ISDC
		Mr. Ahmad Suleiman Bakr	Management Accounting Expert representing UNIDO; ISDC.
		Mr. Abdel Malek Farrash	Secretary to the Council of Ministers and Head of Technical Co-operation Division, Riyadh.
		Dr. Syed Bassam Jabr	Director, Industry & Commerce Department; Ministry of Planning, Riyadh.
		Mr. Rida	Under-Secretary for Economic & Cultural Affairs; Ministry of Foreign Affairs.
		Mr. Mansouri	Under-Secretary for Political Affairs; Ministry of Foreign Affairs.
		Mr. Ahmed Mohamed Ali	President, Islamic Development Bank (IDB)
		Mr. Saeed Ahmad Minai	Vice-President; IDB
		Dr. Ahmed Al-Shanti	Dean of Institute of Applied Geology, King Abdul Aziz University
		Dr. Kamal F. Saad	Chief Technical Adviser (UNESCO) and Head Hydrology Department

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
SUDAN 25-29 November 1977	Mr. M.T. Muntassir Mr. M. Saad Mr. M. Soubra	Dr. Wadie Habashi	Chairman of the Board of the National Council for Research.
		Prof. Ahmed Abdel Rahman El Agib	President of the Council for Scientific and Technological Research- National Council for Research.
		Prof. Mohamad Osman Khidir	Secretary-General, National Council for Research.
		Sayed Abdel Rahman Elagib	Director of the Council for Scientific and Technological Research, National Council for Research
		Mr. Ibrahim Hassan Mohamad	Assistant Director, Council for Scientific and Technological Research, National Council for Research.
		Mr. T. Barlag	UNESCO expert for the establishment of the National Institute for Technology.
		Mr. Abdullatif Widaat Allah	Under-Secretary, Ministry of Industry.
		Mr. Taha El Rouby	Acting Chairman of the Board, Association of Industrialists (private sector) and member of the National Engineers Union.
SYRIA 6-11 November 1977	Mr. M.T. Muntassir Mr. M. Saad Mr. F.R. Hilmy Mr. A. Shuman	Mr. M. El-Khash	General-Director, the Arab Centre for the Studies of Arid Zones and Dry Lands (ACSAD)
		Dr. Jean Khoury	Director, ACSAD
		Dr. Ahmad Osman	Director, ACSAD
		Dr. Ismail El-Bagoury	Director, ACSAD
		Dr. Walid Al-Malik	
		Dr. Abdalla Sallouta	Under-Secretary, Ministry of Industry

Country and date	Member of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
SYRIA (cont'd)		Dr. Shafik El-Safady	Under-Secretary, Ministry of Public Works
		Dr. Said Haffar	Head, Environment Committee, Supreme Council of Science, and Professor, College of Agriculture
		Dr. Wathiq Shahid	Director, Scientific Studies and Research Centre.
		Mrs. Saad Taia	Supreme Council for Sciences.
TUNISIA 1-8 December 1977	Mr. M.T. Muntassir Mr. M. Saad Mr. M. Soubra Mr. K.A. Sabet	Mr. Chadli Tnani	Director General, National Centre for Industrial Studies (Centre National d'Etudes Industrielles).
		Mr. Nagib Chaaban	Deputy Director, National Centre of Industrial Studies.
		Mr. Magtouf Sallagi	Deputy Director, National Centre of Industrial Studies,
		Dr. Salah Bourgini	Directeur Adjoint, Technical Co-operation Department; Ministry of Foreign Affairs.
		Mr. Mohammed Atallah	Assistant Director, Technical Co-operation Department; Ministry of Foreign Affairs.
		Mr. Mustafa M'timet	Assistant Director, Technical Co-operation Department; Ministry of Foreign Affairs.
		Mr. Souai El Hechaichi	Director of Planning; Ministry of Transport and Communication.
		Mr. Sohair Masmoudi	Ministry of Planning
		Mr. Nagi Saeed	Director, National Centre of Leather and Leather Industries.
		Mr. Bechir El Mahgoub	Director of Higher Education; Ministry of National Education.
		Mr. Ezzeldin Maalouf	Assistant Director of Scientific Research; Ministry of National Education.

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
TUNISIA (cont'd)		Mr. Mohamed Sta-M'had	Direftor General, National Institute of Agricultural Research (INRAT)
		Mr. Mustafa Lasram	Head Horticulture Laboratory (INRAT)
		Mr. Ali Khalafallah	Director of Industry; Ministry of National Economics.
UNITED ARAB EMIRATES (UAE) 27-29 November 1977	Mr M.S. Fayyad Mr. R. Faruqi Mr. Ismail Sian	Mr. Ahmad Khallewi	Director, Social Affairs & (Technical Co-operation); Ministry of Planning.
		Mr. El-Hag Ahmad Mohamad	Assistant to Director of Social Affairs; Ministry of Planning
		Dr. Adil Shoukry	Director, Economic Section; Ministry of Foreign Affairs.
		Mr. Munsif Zafraan	Director of Projects, Abu Dhabi Fund for Arab Economic Development.
		Mr. Jean Battaillard	Member of the Board of Directors, Abu Dhabi Investment Authority.
		Mr. Aly Ismail El-Enbaby	Project Manager, Abu Dhabi Investment Authority.
		Mr. Farag Al Mazroui	Under-Secretary, Ministry of Finance and Industry.
		[illegible] other officials (engineers) working in the Department of Industry, Ministry of Finance and Industry.	

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions of Offices represented
UNITED ARAB EMIRATES (UAE) (Cont'd)		Mr. Mohamed Salman	Under-Secretary; Ministry of Agriculture and Fisheries.
		Mr. Mohamed Abdel Aziz	Adviser; Ministry of Agriculture and Fisheries.
		Mr. Atif Suleiman	Adviser for Legal and Administrative Affairs, Abu Dhabi National Oil Co.
		Dr. Hanan Al Jalili	Physical Planner, UNDP Mission on Housing, Building and Planning (Dubai)
		Dr. Alvaro Ortega	Building Adviser UNDP Mission on Housing, Building and Planning (Dubai).
YEMEN ARAB REPUBLIC (YAR) 6-7 December 1977	Dr. M.S. Fayyad Mr. S. Al-Ammari Mr. Ismail Sian	Mr. Mohamed Hussein Nizar	Director of Industrial Department; Ministry of Economy.
		Mr. Mohamad Saud El Jazali	Economic Adviser in Industrial Promotion Unit; Ministry of Economy.
		Dr. Ahmad Hagaye	Team Leader, Planning Experts, Central Planning Organization.
		Dr. Taha Ilyas	Senior Education Adviser & Programme Co-ordinator; Ministry of Education
		Mr. Moqbel Ahmad	Acting Permanent Secretary and Director of Planning & Statistics Department; Ministry of Agriculture.
		Mr. Kamel Mansoor	Expert Team Leader from the World Bank, Ministry of Agriculture.
		Mr. Noga Orabi	Agriculture Expert from the World Bank, Ministry of Agriculture.
		Mr. Mahmood Saeed	Agriculture Planning Expert, Ministry of Agriculture.
		Mr. Hussein Al Faqeeh	Director of Irrigation Department, Ministry of Agriculture.

Country and Date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN (PDRY) 2-14 December 1977	Dr. M.S. Fayyad Mr. R. Faruqi Mr. S. Al-Ammari	Mr. Khalid Hariri	Director of the Department of International and Arab Organizations; Ministry of Planning
		Mr. Abdul Alim Abdul Jabbar	Member, Industrial Department; Ministry of Planning.
		Mr. Mohamad Ali Bassaera	Permanent Secretary; Ministry of Trade and Supplies.
		Mr. Mohamad Ahmed Din Taher	Member of Planning and Statistics Department; Ministry of Labour and Civil Services.
		Dr. Mohamad Jaffer Zain	Rector of the Aden University
		Mr. Abdullah Abadan	Permanent Secretary; Ministry of Industries.
		Mr. Omar Orabi	Head of Studies and Project Preparation Section, Investment Department; Ministry of Industries.
		Mr. Taha Shakir	Section Head for Project Implementation Section, Investment Department, Ministry of Industries.
		Mr. Salim Al Ammari	Section Head of Technical Production Department, Ministry of Industries.
		Mr. Abdur Rahman Badeeh	Deputy Permanent Secretary; Ministry of Agriculture
		Mrs. Salwa Din-Human	Director of Evaluation Section, Planning and Statistics Department; Ministry of Agriculture.
		Mr. Ghazi Ali Ahmad	Director, Department of Planning, Public Corporation for Contracting and Industrial Installation; Ministry of Construction.

ANNEX III

AFFILIATIONS OF MEMBERS OF THE TWO MISSIONS

Name		Affiliation
Mr. Salem Al-Ammari	السيد سالم العماري	UNIDO
Dr. Tarek Al-Khudayri	الدكتور طارق الخضيري	ECWA
Mr. Christopher Baron	السيد كريستوفر بارون	ILO
Mr. Rahman Faruqi	السيد رحمان فاروقي	UNCTAD
Dr. Mohammad S. Fayyad	الدكتور محمد سالم فيّاض	ECWA
Mr. Feridun E. Hilmi	السيد فريدون حلمي	ECWA
Mr. Aly Bey Kecherid	السيد على كيشريد	WHO
Dr. Mohammad Tharwat Montassir	الدكتور محمد ثروت منتصر	ALECSO
Mr. F Pidgeon	السيد ف . بيدجون	ILO
Dr. Michael Saad	الدكتور ميشال سعد	UNESCO
Dr. Kamal A. Sabet	الدكتور كمال ثابت	FAO
Mr. Adnan Shaman	السيد عدنان شومان	FAO
Mr. Ismail Siam	السيد اسماعيل سيام	CAEU
Mr. Mouhieddine Soubra	السيد محي الدين صبرة	ECWA

ANNEX IV

Resolution on
The Establishment of the Arab Regional Centre for the Transfer and Development of Technology

The Joint Meeting of the Representatives of Arab Governments and Arab Regional Organizations on the Arab Regional Centre for the Transfer and Development of Technology,

Recalling Resolution 87(IV) of the United Nations Conference on Trade and Development on strengthening the technological capacity of developing countries, Resolution 2034 (LXI) of the Economic and Social Council bearing the same title, and Resolution 51(IV) of the Economic Commission for Western Asia, entitled "The Study of the Possibility of Establishing a Western Asia Centre for the Transfer and Development of Technology",

Considering the urgent need of the Arab countries for the establishment of the Arab Regional Centre for the Transfer and Development of Technology,

Taking note of the two interagency meetings held by the Economic Commission for Western Asia (Beirut, 24-28 October 1977 and 27 February - 1 March 1978), the two interagency field missions dispatched (1 November - 18 December 1977) to 20 Arab countries for the purpose of drawing up a feasibility study that reflects the thoughts, needs and suggestions of the Arab countries in the field of the transfer and development of technology,

Taking note of the recommendation of the Economic Commission for Western Asia's Second Regional Preparatory Meeting for the United Nations Conference on Science and Technology for Development concerning the Arab Regional Centre for the Transfer and Development of Technology,

Taking note also of the report entitled "First Revised Draft Feasibility Study for the Arab Regional Centre for the Transfer and Development of Technology" (E/ECWA/NR/CTT.2/Rev.2), and the observations expressed by the member States and Arab regional organizations in this regard, Notes with appreciation and satisfaction the participation of Arab governmental and international organizations and bodies and the field missions that visited the Arab countries during the preparation of the study, and

Recommends in principle the establishment of the Arab Regional Centre for the Transfer and Development of Technology, taking into account the First Revised Draft Feasibility Study under consideration, the observations expressed in its regard, and other alternate Arab efforts in this arena, with the purpose of arriving at a unified project agreed upon by the Arab States.

ANNEX V

REPORT

Arab Meeting to Discuss Possibilities for Euro-Arab Co-operation in Establishing a Center for the Transfer of Technology

Cairo, 20-21 September, 1978

In accordance with the recommendation of the Arab Committee for the Euro-Arab Dialogue which met in Cairo from 24 to 26 June 1978, a meeting was held at the Secretariat Headquarters in Cairo on 20 and 21 September 1978, by the Arab side in the Committee on Scientific and Technological Co-operation and a representative of the Economic Commission for Western Asia (ECWA) to discuss the possibilities for Euro-Arab co-operation in establishing the Arab Center for the Transfer of Technology under the chairmanship of Mr. Mohamed Yussef Al Ali (State of Qatar) and in the presence of each of the following:

1.	Mr. Mohammed Abdullah Khalifa	State of Bahrain
2.	Mr. Mahmoud Madani Rashid	Kingdom of Saudi Arabia
3.	Dr. Suhail Abdullah Al Sanawi	Republic of Iraq
4.	Dr. Adnan Shafiq Mohammed Fahmi	Republic of Iraq
5.	Dr. Jamil Nahhas	Republic of Lebanon
6.	Dr. Sayyid Ramadan Hidara	Arab Republic of Egypt
7.	Dr. Khair Al-Din Haseeb	Economic Commission for Western Asia
8.	Dr. Husain Khalaf	Secretariat
9.	Mr. Adil Sabet	Secretariat
10.	Mr. Abdul Rahman Sabri	Secretariat

The representative of the Federation of Arab Scientific Research Councils, who had also been invited, was absent from the meeting.

After approving the provisional agenda and discussing the items included therein the Committee made the following recommendations:

- Noting the report of the Committee of Experts in the Transfer of Technology which met in Bonn (July 1977) within the context of the

Euro-Arab Dialogue and its references to aspects of agreement and disaccord between the Arab and the European sides, especially in relation to the management of the Center and some of its technical functions,

- Recalling the resolution adopted at the joint meeting of representatives of the Governments of Arab States and Arab Regional Organizations (Amman, 16-18 September 1978) on the Arab Regional Center for the Transfer and Development of Technology within the framework of the First Revised Draft Feasibility Study on the Center prepared by the Economic Commission for Western Asia, and which recommended "in principle the establishment of the Arab Regional Center for the Transfer and Development of Technology, taking into account the First Revised Draft Feasibility Study under consideration, the observations expressed in its regard, and other alternate Arab efforts in this arena, with the purpose of arriving at a unified project agreed upon by the Arab States",

- Noting with Appreciation the agreement reached between the Secretary General of the League of Arab States on the one hand and the representative of the Economic Commission for Western Asia on the other regarding the feasibility study on the establishment of the Arab Center for the Transfer and Development of Technology in its final form and the agreement of the Economic Commission for Western Asia thereto,

- Affirming the importance of establishing the Arab Regional Center for the Transfer and Development of Technology,

- Noting with Appreciation and Satisfaction the complete agreement regarding the objectives and functions of the Center in the proposals made by the Arab side in the report of the above-mentioned Committee of Experts and also in the feasibility study,

The Committee Recommends:

1. Emphasizing the completely Arab nature of the Center which should be a regional Arab Center for the Transfer and Development of Technology, and inviting the General Dialogue Committee to review its two resolutions in this regard (Tunis, February 1977; and Brussels, October 1977);

2. Inviting the European side to express its opinion regarding co-operation in establishing the Arab Regional Center for the Transfer and Development of Technology on the basis of the study to be completed by the Economic Commission for Western Asia, taking into consideration the resolution adopted by the above-mentioned representatives of Arab Governments and Arab Regional Organizations, the studies and reports prepared in the context of the Euro-Arab Dialogue and all the observations put forward at the Committee's present meeting on the Center, and inviting the European side to study co-operation in the following fields within the framework of the Euro-Arab Dialogue, for example:

(i) Providing the Center with some of the experts needed in connection with policies and programmes decided upon by the Center and in accordance with the job descriptions which it specifies.

(ii) Setting up the data bank due to be established at the Center.

(iii) Supplying the Center with data related to the Transfer and Development of European Technology and inviting the European side to participate effectively in the Transfer and Development of Technology through this Center.

In this connection the Committee notes with satisfaction recommendation adopted by the Second Conference of Ministers of Science and Technology of the European Countries and North America (MINESPOL II) held in Belgrade from 11 to 16 September 1978, regarding assistance to the developing countries in their endeavours to transfer technology.

3. Delegating the Committee's Chairman to contact his European counterpart during the month of October 1978 on this subject and to communicate the views of the European side in this regard to the Arab Dialogue Committee at its next meeting.

4. That the provisional Committee on the Transfer of Technology continue to discharge its functions under the direction of the General Committee in this regard.

ANNEX VI

Resolution 61(V)

The Arab Regional Center for the Transfer and Development of Technology

The Economic Commission for Western Asia,

Recalling resolution 87 (IV) of the United Nations Conference on trade and Development on strengthening the technological capacity of developing countries and resolution 2034 (LXI) of the Economic and Social Council bearing the same title,

Recalling ECWA resolution 51 (IV) entitled "Study of the Possibility of Establishing a Western Asia Centre for the Transfer and Development of Technology",

Recalling the agreement concluded between the ECWA Secretariat and the Secretary General of the League of Arab States concerning the Arab Regional Centre for the Transfer and Development of Technology (sections 2.4.1, 2.4.2 and 2.4.3 of E/ECWA/67),

Recognizing the urgent need of the Arab countries for the establishment of the Arab Regional **Centre** for the transfer and development of technology,

Taking note of the report of the Executive Secretary on this subject (E/ECWA/66), the First Revised Feasibility Study on the Arab Regional Centre for the Transfer and Development of Technology (E/ECWA/67) and the report on ECWA's Joint Meeting of Representatives of Arab Governments and Arab Regional Organizations on the same subject (E/ECWA/68),

Taking into consideration the resolution adopted by ECWA's Joint Meeting of Representatives of Arab Governments and Regional Organizations on the Arab Regional Centre for the Transfer and Development of Technology, held in Amman between 16-18 September (Appendix I of E/ECWA/68) and the report and recommendations of the Arab Meeting to discuss possibilities for Euro-Arab Co-operation in Establishing a Centre for the Transfer of Technology held in Cairo between 20-21 September 1978 (Appendix II of E/ECWA/66);

1. Notes with appreciation and satisfaction the implementation of the tasks described in operative paragraphs 1, 2, 3, 4 and 5 of ECWA resolution 51(IV);

2. Decides in principle to establish the Arab Regional Centre for the Transfer and Development of Technology;

3. Requests the Executive Secretary to prepare a second revised version of the feasibility study taking into consideration the comments made on it by the fifth session of ECWA;

4. Requests the Executive Secretary to contact the Secretary General of the League of Arab States for the purpose of submitting the second revised version of the feasibility study to the Economic and Social Council of the League of Arab States for discussion and adoption;

Requests the Executive Secretary, following the approval of the feasibility study by the Economic and Social Council of the League of Arab States, and in co-operation with the Secretariat of the League of Arab States, to invite the Arab Governments, regional Arab organizations and the Economic Commission for Western Asia to a meeting for the purpose of taking the necessary measures to set up the Arab Regional Centre for the Transfer and Development of Technology.

10th Meeting
6 October 1978